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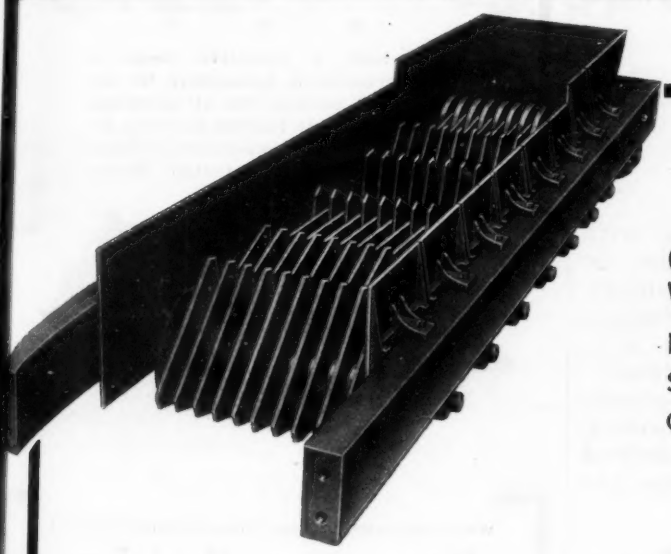

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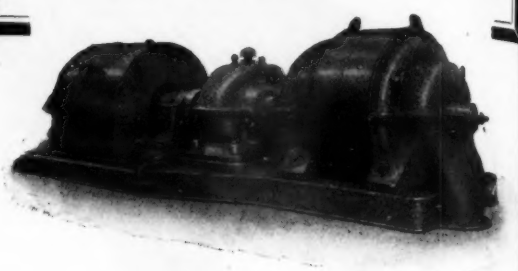

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Gas Journal

MAY 1, 1935

Vol. 210. 87th Year No. 3754.

THE "Gas Journal" joins in the general rejoicing at the Silver Jubilee of Their Majesties, and especially voices the loyal and thankful sentiments of the British Gas Industry. Long may the King and Queen be spared will be the prayer of their grateful subjects the world over.

The Royal Family and Commerce and Industry

By Sir FRANCIS GOODENOUGH, C.B.E.

This country—by which I mean the nations occupying the British Isles, and which one may without offence to any one of them call "this country"—has long prided itself upon containing the leading Merchant Adventurers of the world and has refused to regard as an insult the title of a Nation of Shopkeepers, holding that that title can only convey opprobrium if commerce be conducted dishonourably and without recognition of its obligations as a public service.

In their development of the adventure of trade throughout the world and on all of the Seven Seas our people have therefore looked, naturally and not in vain, for leadership (and the encouragement which wise leadership always gives) to the Head of the Family—to the King and to the Queen and their children—and, at this time of rightful Jubilee, of widespread rejoicing because His Majesty has been spared for twenty-five eventful years to reign over them, all those concerned in the Industry and Commerce of the country feel a sense of very deep gratitude to the Royal Family for all that they have done for them constantly, at a great expenditure of time and energy such as few royalties in the history of the world have ever devoted; and at a cost of leisure and pleasure sacrificed to duty that few outside Royal circles can possibly assess and appreciate.

By their travels, to other parts of the Empire and to foreign lands, the King and his sons have set an example of studying at first hand the markets and the peoples of the world that has been followed with advantage by many—and might be followed profitably by many more—of our manufacturers and merchants. They have lived up to the motto "I serve" to a degree that all of us engaged in business would do well to adopt both in principle and in practice.

The memory of the speech which the King, when still Prince of Wales, made at Guildhall in the City of London on his return from a world-wide voyage, ending with his exhortation to "Wake Up, England," still remains, and its effects were notable and long continuing. They were revived and reinforced by his son, the Prince of Wales of to-day, when in the same place he spoke at the annual dinner of the Sales Managers' Association nearly five years ago (with a "gas man" in the Chair) and that was only one of several occasions in recent years on which the Prince showed his close, intelligent, and well-informed interest in British commerce, his enthusiasm for the Adventurous Trader, and his keenness for the better education and training of the business recruit.

There is little, if any, doubt that it has been recognition, first of the splendid relations existing between employers and workpeople in the Industry, and second of the progressive principles and practice characteristic of the Industry in its relations with the public—recognition, in brief, of its industrial statesmanship and its commercial salesmanship—that has led the King, the Prince of Wales, the Duke of York, the Duke of Kent, and the Princess Royal to show their interest in the Gas Industry on numerous occasions during the past ten years or so, including visits to Works, to B.C.G.A. Conferences, and to Exhibitions. This interest has been tremendously appreciated throughout the country—and, indeed, abroad, for the very friendly interest shown in the Gas Industry of the U.S.A. by the Prince of Wales when he twice gave audience to Clifford Paige when, as President of the American Gas Association, he visited London in 1931, was greatly appreciated not only by those on this side who were responsible for securing those audiences, but by Paige and his colleagues in America, as the present writer discovered when he went to the States later in the same year.

So long as the Gas Industry continues humane and enlightened in its labour policy and progressive and enterprising in its commercial policy, there is no doubt it will continue to enjoy the measure of Royal patronage that has given it full cause in the past, as in this Jubilee Year, to pray with heartfelt earnestness

GOD SAVE THE KING.

The Gas Industry and Jubilee Rejoicings

1887, 1897, 1935

Glimpses into "JOURNAL" Volumes portraying vividly the development of the Gas Industry during the past fifty years

By **A. H.**

Queen Victoria's Golden Jubilee.

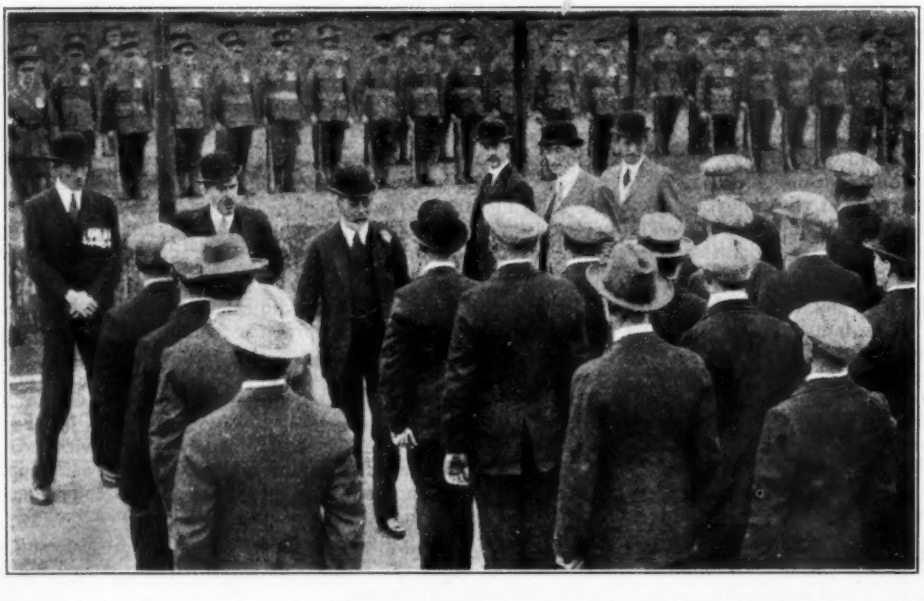
The Silver Jubilee of King George V. is the third Royal Jubilee to be honoured in this country within a space of less than fifty years; the two previous ones having been Queen Victoria's Golden Jubilee (1887) and Diamond Jubilee (1897). As early as the first of these historic occasions, the "JOURNAL" itself had attained to an age of nearly forty years—and so, it may be incidentally remarked, was well on towards the goal of its own Jubilee, in addition to having covered the major part of the great Queen-Empress's glorious reign. Thus for the tale of the Gas Industry during those years—full of progress of the country's commerce—the volumes of the "JOURNAL" may be consulted. Turn, for a few moments, to those for 1887, and see how many matters and how many names jostle each other in their haste to return to the very forefront of one's mind, from the recesses to which they had been relegated by the pressure of later matters and of later names.

Gas for Illuminations.

But it is for references to the Victorian Jubilees that one is glancing at these old volumes now, and in this regard it is found that on each occasion—as, indeed, many of those who read these notes will remember, and all will expect—both gas and the "JOURNAL" had their parts. Gas, with its brilliant, sparkling movement, affords an unrivalled means of decoration, and naturally, therefore, it was largely in demand during the celebrations. So well, indeed, was this suitability recognized, that the late Thomas Newbigging included in some of the editions of his famous *Handbook for Gas Engineers and Managers* a number of appropriate gas devices for outdoor use. In 1886 he went further, and published from the "JOURNAL" Office a special book of "Devices for Gas Illuminations in Celebration of the Jubilee Year of the Reign of Her Most Gracious Majesty Queen Victoria, with Instructions for the Production of Coloured Fires, &c." In the eighty-two devices presented in that book there was both variety and originality, and they certainly afforded ample scope for a glittering public display. It may be mentioned that the field was not occupied entirely by gas; for a writer of the time explained that, though the greatest share in the illuminations was performed by this medium, "which so readily lends itself to this mode of public rejoicing, oil lamps, the electric light, and even candles, came in as not unwelcome auxiliaries in the most brilliant display of artificial light ever made in the Metropolis." Flood-lighting, of course, was not at that time in vogue.

Consumption Figures.

In view of the extent of the illuminations during the 1887 Jubilee, there were expectations that the gas consumption of the Metropolis would be greatly affected, but the actual figures confirmed in a striking manner an opinion which had been expressed in the "JOURNAL" that, although



His Majesty the King inspecting the ranks of Rangers and ex-service men on the occasion of his and the Queen's visit to the Beckton Works of the Gas Light and Coke Company to open the new coal-handling plant in July, 1926.

the quantity of gas that would be burned in the open air would be much greater than had ever previously been witnessed, the total consumption would not be much above the average. Actually some increase in consumption was experienced in the area of the Gas Light and Coke Company; in the East-End the illuminations about compensated for the disuse of gas indoors; while on the south of the Thames, in the district of the South Metropolitan Gas Company there was an absolute falling-off—there being very few illuminations to compensate for the closed shops.

Their Majesties walking through the Sports Ground at Beckton, July, 1926.

Free Gas.

This having been the experience in London (which probably indicated the situation over the country generally), it is a little disappointing to find that most of the references in the "JOURNAL" in 1887 were to "Free Gas for Illuminations," a policy which was mooted mainly among certain Corporations in the North, who felt a desire to celebrate the occasion by offering this free gas, under certain restrictions. However, it proved to be a highly controversial subject; for in one case, at any rate, it found its way into the Law Courts.

A Ratepayers' Association of Blackburn applied for an injunction to restrain the Corporation from "supplying gas gratis to burgesses in the principal streets who wished to illuminate their buildings on the occasion of the celebration of the Jubilee." It was also sought to prevent the Mayor and Corporation from applying any part of the borough fund in payments for the local public festivities. Mr. Justice Chitty said that the supply of gas gratis was a subsidiary question which depended upon the effect to be given to the provisions of the statutory powers under which the Corporation supplied gas. Without a more detailed examination of these provisions, he was not prepared to decide that question; and in this respect he held that the Ratepayers' Association had not, upon the motion, shown any case for the granting of an injunction. With regard to the other matter, also, it had not been shown that the Corporation had done anything irregular. So the interim injunction was refused; and ultimately it was arranged that all further proceedings in the action should be stayed.

The Great Day.

At last the great day arrived, and singularly enough it was a day upon which the "JOURNAL" was published—June 21, 1887.

It was said: "Ten years ago, when the Jablochkoff candles appeared in Paris, there might have been found a host of scientifically-minded persons to declare that by this time gas-piping would be valuable only as so much old iron. How different is the reality! It is doubtful whether there was ever so much gas-piping used at one time as will be in blazing service to-night; and it may be safely predicted that never before will there have been so much gas burnt in the open air as upon this occasion. Not that the total consumption of gas may be greatly above the average, for the closure of houses of business and the fact of the whole population taking to the streets during hours when they would otherwise be engaged at home will naturally tend to equalize matters."

Looked at from this point of view, the proposals to supply free gas are likely to be regarded as good patriotism, if not good business. To what extent the idea may have been adopted, it is impossible now to say; but we do notice, in addition to various municipal undertakings, a statement, published after the Jubilee, to the effect that "the Directors of the Guildford Gas Company have decided that they will not make any charge for the gas consumed for the purpose of illuminations on Jubilee Day." The Canterbury Gas and Water Company decided to celebrate the Jubilee in a slightly different manner—namely,

Her Majesty the Queen inspecting the manufacture of gas mantles at the British Empire Exhibition, Wembley, May, 1925.

by giving the consumers a bonus of 3d. per 1,000 cu.ft. on the gas consumed during the quarter. No doubt, the word "bonus" was used to describe the gift, rather than "reduction," because it was confined to the one quarter.

Some of the most striking illumination displays were described in the pages of the "JOURNAL," and from these descriptions it is not difficult to realize—for those who did not have an opportunity of seeing any of them—the effectiveness of the displays as a whole, and the gorgeousness of many of the individual devices in glistening crystal or scintillating naked gas jets.

H.R.H. the Prince of Wales, with Sir David Milne-Watson, at the opening of the £1,000,000 Coke Oven Plant at the Beckton Works of the Gas Light and Coke Company, May, 1932.

The Diamond Jubilee of Queen Victoria.

Again in 1897, when Queen Victoria celebrated her Diamond Jubilee, the date of the rejoicings (June 22) coincided with the usual publication day of the "JOURNAL," but it was decided on that occasion to meet the general convenience by putting publication forward one day. An editorial was devoted to the fact that the most notable week of a most wonderful year had passed into the domain of history, though there is a plaintive air about the remark of the leader writer of the time, that "there is little else to be talked about just now, but the Diamond Jubilee celebrations, by which the people have recognized and commemorated this consummation of the longest and noblest reign enjoyed, or endured, by any wearer of a crown since the world began." And Queen Victoria was to occupy the throne for three-and-a-half years beyond this time, when she was succeeded by Edward VII., who reigned for nine years.

Gas Holds its Own.

Once more, of course, public illuminations formed a big feature in the celebrations, and in this respect the verdict was that gas was as popular as ever, notwithstanding the rivalry of electricity in its two forms of arc and incandescent lamps. Cut crystal, and other devices of the familiar "transparency" order, were plentiful; but the massive simplicity of gas flambeaux, and the always effective plan of outlining architectural features with small points of light, were equally popular. There were fewer attempts than of yore in the direction of piling up huge open gas-jet displays in a vertical plane, "which," it was pointed out, "are liable to the disadvantage of excessive flickering of the upper lights owing to the lack of oxygen, but where this defect is not too pronounced, the liveliness of gas-jets as compared with the stillness of incandescent electric lamps used in a similar way is to the advantage of the former. Altogether, it can be truly said that gas as a means of festive illumination, quite held its own in London and the Provinces; and the circumstance that nothing startling in the shape of a novel application of this medium has to be recorded may be taken to imply that its capacities in this regard are now thoroughly understood by professional decorators, and appreciated by the public."

The "JOURNAL" description of the gas illuminations in the City and West-End in June, 1897, extending to between two and three columns, affords ample justification for the contention that anyone connected with the Gas Industry who traversed after nightfall the portion of the route of the royal procession lying north of the Thames would have had no cause to be ashamed of the display made by his illuminant.

A Mistaken Impression.

In one important respect, it was regarded by the "JOURNAL" as desirable to clear the air of misapprehension. So it was pointed out that "one of the commonplaces of popular criticism that never fails to make itself heard in connection with such occasions as the Jubilee celebrations is that the illuminations, and all that sort of thing, must be 'good for the gas companies,' who are not infrequently expected to contribute liberally to the expenses of town decorations on this account. The gift of free gas for illuminations is often suggested as a graceful act in the circumstances which no self-respecting gas company should be averse to performing. It may be as well, therefore, to remark that, so far from being a 'good thing' for a gas undertaking, a public holiday with illuminations brings to the gas office nothing better than a fall in revenue, and an infinity of trouble, anxiety, and extra work. The special consumption of gas in illuminations, however lavish, does not, and as a matter of fact cannot, compensate for the diminished consumption due to the closing of houses of business; while the obligation to give an increased temporary supply in places where proper provision for making effective use of it does not already exist, is a severe strain upon the resources of the distributing department."

Nevertheless, as in 1887, intimation reached the "JOURNAL" from various quarters of the intention of local authorities (and of several gas companies, including those at Tottenham and Dorking) to supply gas free for illuminations. In other cases it was offered on greatly reduced terms.

'Tis Sixty Years Since.

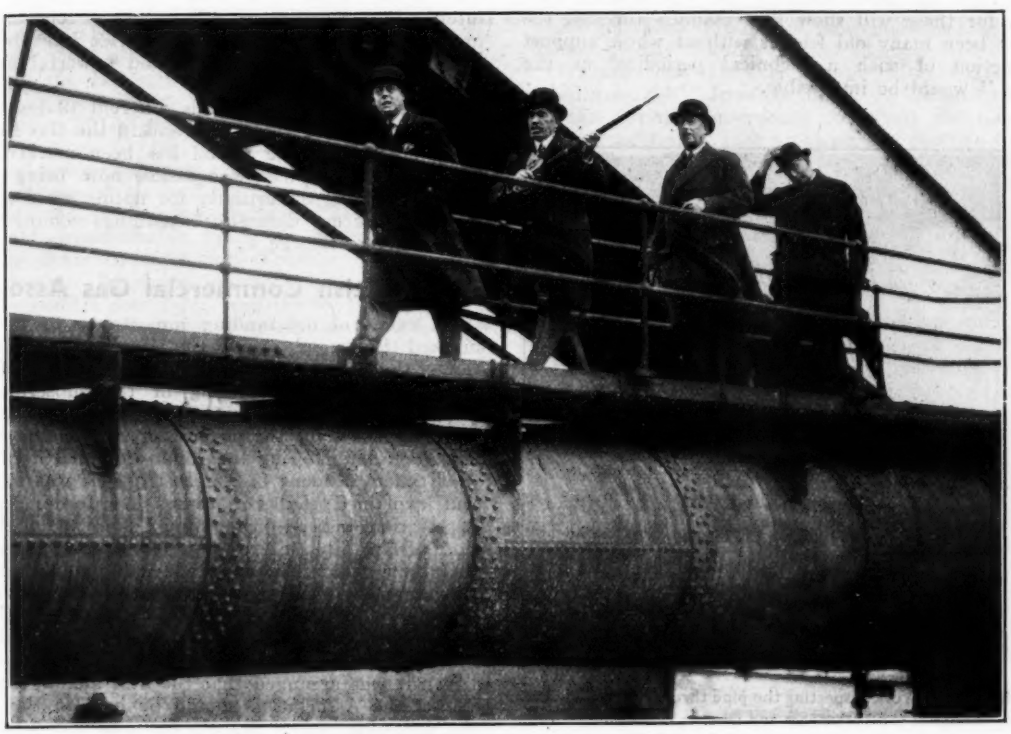
Under this heading, there appeared an anonymous article in the issue of *Blackwood* for the month preceding the Jubilee, and, from the extracts which were made from it in the "JOURNAL," it is evident that the writer was particularly interested in the subject of lighting. He reminded his readers that "the age of Victoria, in many ways so full of light, was not within doors and in its domestic centres a bright age when it began. Gas had, indeed, come into the world to light the streets, and more or less the shops, in great thoroughfares; but in our homes the lights were few. The primitive cruse of oil, with its rough wick and smoky flame, at once feeble and wavering, gave a very dim aid to the fire-light on a cottage hearth; and in the homes of middle class respectability a mild twilight lingered, with deep darkness in every corner. When there was no company, a pair

candles, flanked by a snuffer-tray, was considered sufficient for ordinary family purposes."

Lucifer matches were introduced about the beginning of the Queen's reign; but, like most other novelties, they were objected to by an unappreciative public. Indeed, the writer confesses that "all the new inventions which have added so greatly to our comfort were received without enthusiasm—from the railway, on which a cow errant was supposed to be capable of proving a serious embarrassment, to the matches, which had a bad smell. When candles were made which wanted no snuffing, although it was manifestly a great convenience, there were revilings—it being supposed at first that they were not so bright as the old smoky flame!"

The title of the article from which these quotations were taken was borrowed from *Waverley*, and as to this the "JOURNAL" said: "Whatever else Sir Walter Scott might have deplored in modern civilization, he would have warmly welcomed the great popularity of illuminating gas, for was he not himself Chairman of the first Edinburgh Gas Company?"

trolled by a ball-cock. From this point it may be better to follow exactly the description given in the "JOURNAL," which was prefaced by a remark of the representative that he was not yet in a position to describe the lamp in detail: "A little tap inside regulates a supply of water which passes up the lamp-column, and is converted into steam; this being led down the lamp for the purpose of heating the water in the tank. It is stated that only about 2 gallons of water are used in 10 hours for the heating of 50 gallons. The quantity of gas used varies according to the size of the apparatus, but in the lamp shown (which has a cluster of lights) 26 cu.ft. per hour are employed for lighting, and the waste heat is found sufficient for maintaining the supply of hot water. By placing a halfpenny in a slot, a gallon of hot water can be obtained; and that the water is of high temperature may be tested by the lamp in the exhibition. The inventors suggest that between each withdrawal of water about three minutes should be allowed to elapse. One can quite conceive many situations and occasions in and on which such a means of procuring a supply of hot water would be very convenient;



H.R.H. the Prince of Wales inspecting the Coke Oven Plant at the Beckton Works, May, 1932.

An Imperial Exhibition.

Nothing could have been more fitting than that the Crystal Palace (in the opening of which as the first "Exhibition of All Nations," on its original site in Hyde Park, Queen Victoria took the most prominent part in 1851) should be associated with the Diamond Jubilee commemoration, by collecting under its roof a vast number of exhibits indicating the marvellous progress which had been made in the arts and industries of the country during Her Majesty's long reign. The opportunity which such an exhibition afforded for displaying some of the latest improvements in the use of gas for lighting, heating, and cooking was seized upon by the Industry—as has been the case with similar exhibitions since that time. To the South Metropolitan Gas Company was accorded a great measure of the credit for the excellent show that was made.

Glancing through the description of the exhibits, many familiar names are encountered, though naturally there are a few with whom the younger generation are less likely to be acquainted. One of the latter is the Hot Water Supply Syndicate, whose special type of street lamp was on view. The base of this lamp was square, and was used for the storage of water, the supply of which was con-

but it would be interesting to learn the results of experiments as to the temperature at which the water can be maintained in an exposed position during extremely cold weather, with frequent drawings of water." Such a lamp may almost have conjured up in the mind of the "JOURNAL" representative visions of men going about with soap and safety razors, secure in the knowledge that they would be able to get a shave at "any old lamp-post." Or is the safety razor the product of a later time?

Labour in the Victorian Age.

Just one more "peep," and quotation. This is taken from the number of the "JOURNAL" following the Jubilee, and it deals with an aspect of our civilization as vital to-day as it was then. Amidst the glories of the Victorian Age, it would have been strange indeed had the condition of the labouring classes of the community not improved, and, as a matter of fact, it did improve enormously. "It is," said the "JOURNAL" writer, "a fine thing to realize, as was never done before, all those grand visions of world-wide empire that have dazzled the people of this astonishing realm during the past week. There has been something in the happy completion of the sixty

years' reign well worth flashing our electric lights, blazing our gas illuminations, and flaring our fireworks and bonfires about; but if the hackneyed complaint of the Socialists had been well founded, and the operation of our Imperial institutions had been to make the rich richer and the poor poorer, there would have been a deep shadow over our rejoicings. There have been empires before the Victorian, but it is safe to aver that never under any one of them was the lot of the people who have to work for their daily bread so happy as it actually is here and now."

But at last, regretfully, Vol. 69 of the "JOURNAL" (published in the 49th year of its life) must be closed. The peep taken into its pages, and into the pages of Vol. 49, published in 1887—has been refreshing, as furnishing evidence of the progress of our Industry, such evidence, too, as can be secured from no other source of which the "peeper" is aware. Good as memory may be, it is the better for occasional assistance, and to those who are fortunate enough to possess bound volumes of the "JOURNAL" going back into the last century may be commended a glance now and again over issues taken at random. And the advertisement pages should not be neglected, for these will show how staunch through the years have been many old friends without whose support the production of such a technical periodical as the "JOURNAL" would be impossible.

H.R.H. the Duke of York inspecting the pipe threading machine in the Fittings Shops of the Tottenham and District Gas Company on the occasion of his visit to inaugurate the intermittent chamber oven plant at the Company's Willoughby Lane Gas-Works, December, 1933.

But if looking backward may be so pleasant, what of looking forward? The Author of the article on "Labour in the Victorian Age" remarked, "Well is it that one cannot see into the future," but he did not know how well it is. The years of trial and tribulation—1914-1918—were not yet.

The Silver Jubilee of King George and Queen Mary.

In the "JOURNAL" for May 10, 1910, speaking with sorrow of the death of King Edward VII., and with loyalty and goodwill of the accession of King George V., the Editor said: "The times demand from the Ruler of the British Empire the exercise of that wisdom, that broad-minded toleration, that aplomb, and that judicial interpretation that were the characteristics of him whose sceptre has now been laid aside. The devotion of King George to Country and Empire was well attested while he was Prince of Wales, and the responsibilities of his high office are recognized by him as a sacred duty. During the reign which all pray may be long and happy, there is every confidence that, within the latitude of his power, nothing will be left undone by him that will tend to the maintenance of the prestige, the prosperity, and the progress of the British Empire and people." A quarter-of-a-century has passed; and these sentiments stand justified to the full.

To-day it is with a feeling of the most intense gratification that we mark the Silver Jubilee of the reign of our beloved Sovereign. We rejoice that he has been spared so long to occupy his exalted position, and trust that there remain to him, and to his Queen, who is enshrined in the hearts of all of us, a long period of health and happiness. The years that lie behind have been eventful ones, fraught with great consequences; may other lie ahead, filled with peace, honour, and prosperity. As a nation, his subjects are gratefully mindful of all that they owe to their Sovereign. As an Industry, we acknowledge special indebtedness to the King and Queen, and to the other members of the Royal Family, for repeated proofs of a lively interest in our doings. Gracious acts of recognition of the importance of gas as a public service have been, to all associated with it, a frequent and powerful incentive to redoubled effort.

In many ways the world is different to-day from what it was twenty-five years ago, and in the Gas Industry, as in other spheres, the period has been marked by many milestones. The happy occasion now being celebrated affords a fitting opportunity for noting some of the most important of our domestic happenings coming within the reign of King George V.

The British Commercial Gas Association.

An event of outstanding importance to the Industry marked the second year of the King's reign, in the formation of the British Commercial Gas Association. In October, 1911, there was a meeting of the subscribers to the Publicity and Special Purposes Fund of The Institution of Gas Engineers, for the purpose of establishing an Association for administering the fund. Mr. R. G. Shadbolt, at that time President of the Institution, was in the chair, and explained that the reason for forming a separate Association, instead of having a Committee of The Institution of Gas Engineers, was that they had no authority to form a Committee upon which individuals might serve who were not members of the Institution. On the motion of Alderman Phillips, then Chairman of the Salford Corporation Gas Committee (seconded by Mr. H. J. Yates, Chairman at the time of the Society of British Gas Industries), it was arranged that the first annual general meeting of the Association should be held in the autumn of the following year. Manchester was the city chosen for this first annual meeting, which took place early in October, 1912, under the Presidency of Mr. (later Sir) Corbet Woodall, who thus headed the Association's long list of distinguished Presidents.

The Institution Jubilee.

Another event of great importance to our Industry was the Jubilee Year of the foundation of the Central Organization of the Gas Industry, under the title of the British Association of Gas Managers. The Jubilee annual general meeting of The Institution of Gas Engineers, as the successors to the British Association of Gas Managers, took place in London in June, 1913, under the Presidency of Sir Corbet Woodall.

Opening the proceedings on that occasion, the President remarked that a happier incident wherewith to celebrate the jubilee of the Institution could hardly have been found by the Council and the members than that to which they were about to give effect. To Mr. Thomas Newbigging, he believed, was due the conception of the British Association of Gas Managers. Certainly, it was he who brought together the first gathering of men in Manchester who decided upon the formation of that body. The child of his begetting had grown to healthy manhood, and they was very glad to have Mr. Newbigging there that day to rejoice with them at its mature strength. An oil

painting of Mr. Newbigging was then unveiled, and it was noted that it bore the following inscription: "Thomas Newbigging, M.Inst.C.E. Presented to him by the members of The Institution of Gas Engineers on the occasion of its Jubilee, 1913."

The Author of the Handbook.

Thomas Newbigging did not long survive that ceremony, for when the Institution met twelve months later his death was announced as having taken place a few days previously. No one in the Gas Industry has ever been better known or more widely respected than Thomas Newbigging, whose sound advice and ready help made many of us his debtors. In the "JOURNAL" Office he is still happily remembered in connection with the close business relationship (as publishers of his universally known *Handbook for Gas Engineers and Managers*) that existed with him over a great number of years. Even now inquiries for the *Handbook* continue to come along from time to time.

One of the original members of the Manchester District Institution of Gas Engineers, and for many years its Hon. Treasurer, Thomas Newbigging was President in 1879. He was elected President of the Society of British Gas Industries for the year 1909. It will be recalled by the older members of the Industry that he was a prolific writer. Quoting from the memoirs included in the Transactions of The Institution of Gas Engineers: "Apart from his technical contributions, he made two valuable additions to the literature of gas manufacture. Early in 1870, he published the first edition of his well-known 'Handbook.' Other editions followed, the last being published in 1913. Another work, in the production of which Mr. Newbigging had a very large share, was 'King's Treatise on Coal Gas,' which appeared in three large volumes—the first in 1878, the second a year later, and the third in 1882. In editing this work he had the co-operation of the late Mr. W. T. Fewtrell. Gas matters, however, did not by any means absorb Mr. Newbigging's attention."

A National Gas Congress and Exhibition.

The year 1913 will also be remembered by the National Gas Congress and Exhibition, originally conceived in connection with the jubilee of the Institution, and which developed into a striking demonstration of the progress of gas. This congress and exhibition was accorded the patronage of the King and Queen, and of Princess Louise, Duchess of Argyll. The President of the Exhibition was Sir Corbet Woodall, and, quoting from the "JOURNAL" at the time, "he worked hard, through personal acts and influence, in making it the magnificent success that it was. The pivot, mainspring, and we do not know what else, was Mr. (now Sir) F. W. Goodenough, who had at his back a loyal and energetic Committee; and the man who blessed the exhibition at the opening, who gave it his countenance on more than one occasion, was the [then] Lord Mayor of London, Sir David Burnett, Bart." The Chairman of the Executive Committee was Mr. Goodenough, with Mr. H. M. Thornton as Vice-Chairman. The exhibition and congress covered the month of October; the venue being the International Exhibitions Halls, Shepherd's Bush, which had previously formed the entrance to Imre Kiralfy's masterpiece, the "White City."

The opening of this great co-operative effort on the part of all sections of the Industry (it was organized by the leading Gas Companies and Corporation Gas Committees of the United Kingdom and the Society of British Gas Industries) was an impressive function, and it was marked by a telegram tendering dutiful and loyal greetings to the King, and offering his Majesty and the Queen heartfelt thanks for their patronage of the Exhibition and Congress. In reply, the following gracious message was received by Sir Corbet Woodall:

> Balmoral Castle.
>
> I am commanded by the King and Queen to thank the President, Vice-President, Patrons, and Committee of the National Gas Congress and Exhibition for their loyal message, and to assure them that Their Majesties hope that every success may attend their exhibition.—STAMFORDHAM.

On the eve of the closing of the exhibition, the President arranged a small dinner party, and among those present was Mr. James W. Helps—the central figure in the ever memorable Earl's Court Gas Exhibition of 1904, and one of the first in warmly congratulating Mr. Goodenough on the success of the National Gas Exhibition of 1913. This reference to the earlier exhibition reminds us that the Society of British Gas Industries had its origin very largely in an article which appeared in the "JOURNAL" at the time of the Earl's Court Exhibition, suggesting the formation of such a body.

The Industry and the War.

The Institution assembled in Liverpool in June, 1914; the last full gathering of this body that there was to be for some time. But no hint was there during those pleasant days of the catastrophe which was within a few short weeks to envelope ourselves, and ultimately the greater part of the civilized world, and which for more than four terrible years was to govern every thought and every action both within our own Industry and outside. As day after day, month after month, and year after year, came and went, the tale of this appalling tragedy was unfolded.

Writing less than six months after the outbreak of hostilities, the "JOURNAL" said: "Royally and loyally in the national emergency came out the Gas Industry, taking, as it does, such an important place in the daily life

Their Royal Highnesses the Duke and Duchess of York at the inauguration of the Vertical Retort Plant at the Granton Works of the Edinburgh Gas Department, October, 1926.

and interests of the nation. It had only just emerged from a half-year when high coal prices and poor markets for residual products had done much to mar an accustomed prosperity. But this made no difference whatever. With a single eye to its responsibilities, it set to work in the national cause. In its ranks—in its gas-works, in the works of the manufacturers of gas plant—were thousands of reservists (military and naval) and territorials. Every facility was at once given to these men to join the Colours. Encouragement was given to other men to join the forces; and quite recently Sir Corbet Woodall was exhorting still others to offer themselves as 'willing men.' But there has been so much willingness that in some quarters inconvenience has arisen through the depletion of the ranks of skilled gas workers. In consequence, The Institution of Gas Engineers obtained from the War Office a pronouncement that such men were not now to be accepted for enlistment without a certificate from their employers that their services could be dispensed with."

Of the great part which the Gas Industry subsequently took in the events of these war years—in the provision of materials for high explosives, and in innumerable other ways—this is not the time to speak in detail; but no consideration of the events of the past quarter-of-a-century can omit reference to this world upheaval.

The "Gas Journal."

One domestic matter that marked the period under review was the change of our own title. The end of 1916 saw the last number of the "JOURNAL" that was to appear under the old title of the "JOURNAL OF GAS LIGHTING," with which it was brought into existence as long ago as 1849. With the development of the Industry, and the unceasing broadening of its methods, the new title of the "GAS JOURNAL" became more appropriate. Indeed, as the oldest paper devoted to the interests of the Industry, it had been known by this shorter name for many years before the change in title was formally made.

Formation of the National Gas Council.

Towards the end of 1916, at an adjourned conference of the Councils of The Institution of Gas Engineers and the Society of British Gas Industries, the General Committee of the British Commercial Gas Association, and the Committee of the Gas Companies' Protection Association, with Alderman F. S. Phillips in the chair, the formation of the National Gas Council was decided upon. This was, as the "JOURNAL" remarked at the time, an event of the utmost importance to the future of the Gas Industry. An adequate representative body for the entire Industry had for some years been a favourite topic with the "JOURNAL." The war and its problems compelled the Industry to action. The first President was Mr. H. E.

Their Royal Highnesses the Duke and Duchess of York at a Conversazione held in connection with the Eighteenth Annual General Meeting and Conference of the British Commercial Gas Association at Eastbourne in 1929, under the Presidency of Mr. Frank Harding Jones, M.Inst.C.E., who is seen with Their Royal Highnesses in the photograph.

Jones, and the Council was composed of the Councils and the Committees of the four bodies already named. From the Council a General Consultative Committee was elected, of which Alderman Phillips was the Chairman; and from the General Consultative Committee an Executive Committee (consisting of representatives of gas undertakings) was appointed, and of this Mr. (now Sir) David Milne-Watson, the present President, was chosen as Chairman. In connection with coal supplies and other matters, the Council very soon found work to their hand.

Labour Disputes.

The year 1918 closed amid a feeling of profound thankfulness; for the Armistice had been signed, and we were awaiting a peace which it was hoped would usher in an era of prosperity and contentment. "Never again," was the thought, "will there be a repetition of such world agony as the years since 1914 have witnessed." Reconstruction of the National Gas Council on more powerful lines, and the formation of the Scottish Gas Council were other favourable omens of that year. The National Benzole Association (with Sir David Milne-Watson as President) was among the births of 1919.

The era of peace was, however, realized at once only in the military sense, inasmuch as the business of the country became much disturbed by industrial upheavals. A three months' coal strike was one of the events of 1921, and this, of course, plunged the Gas Industry into renewed difficulties; while during the early days of May, 1926, the nation was subjected to the dangers and hardships of a general strike of men engaged in transport and many other forms of work. This, after a little less than a fortnight, was unconditionally called off by the General Council of the Trade Union Congress. The coal industry remained troubled, and this time there had to be reckoned with seven months' loss of work and trading to numberless persons engaged in coal and coal mining.

Mr. Therm.

Transcending in permanent importance for the Industry all else that had occurred during the twelve months was the passing of the Gas Regulation Act, 1920. This event did, indeed, mark an important epoch in the history of the Industry. We are all now so accustomed to the therm—and to that delightful little person, Mr. Therm, who greets us wherever we go—that it is sometimes hard to realize how comparatively recent is its introduction as a basis of charge for gas.

Wembley Gas Exhibit.

A National Gas Exhibition in Bingley Hall, Birmingham, in 1923, was followed in the next year by the striking Joint Gas Exhibit in the Palace of Industry which formed part of the historic British Empire Exhibition at Wembley. Sir D. Milne-Watson was Chairman of this Joint Exhibit, and Sir F. W. Goodenough was the Chairman of the Organizing Committee. His Majesty, in State, opened the Exhibition, accompanied by the Queen; and on arrival the Prince of Wales, who was the President of the Exhibition, received his royal parents.

In the course of their first informal visit to the Exhibition, Their Majesties, accompanied by the Duke and and Duchess of York, inspected the Gas Exhibit, which, it was explained to them, represented the co-operative effort of all the leading, and a great many of the smaller, gas undertakings of all parts of the United Kingdom. The first exhibits inspected were those of sweetmeat-making and pottery firing. At the latter, the Queen was shown the interior of the gas-kiln in which pottery was being baked. At the adjoining exhibit a crucible of molten aluminium was being drawn from the furnace, and Their Majesties watched it being poured into moulds, while it was explained to them that aluminium castings were largely used in motor-car, aeroplane, and submarine construction. His Royal Highness the Duke of York remained watching the cutting of metal by oxy-coal-gas flame, while the Queen passed on to inspect the cookery demonstration section, where work was in process, and thence into the Rest Lounge.

Here Her Majesty and the King immediately evinced much interest in the tableaux representing "The Seven Ages of Woman." Her Majesty suggested to the King that they should inspect the whole series of tableaux in proper order; and accordingly they were conducted first to the nursery, where the gas cooker and the bath enclosed in cupboards attracted attention and comment. Next in order, the children in the playroom, one of them riding her rocking-horse with smiling enjoyment, greatly amused Their Majesties. The King chatted in a most friendly manner with them, and laughed heartily over their unaffected replies to his questions. Passing the school-girl in her domestic science classroom, the nurse probationer in her "bachelor" bed-sitting room, and the business woman in her all-gas restaurant kitchen—with a kindly word and a smile to each happy, curtseying girl, and interested questions to their conductor as to the purpose of the several sections—Their Majesties paused to speak to the lady who was, as the King laughingly expressed his surprise to find any woman, "brave enough to admit she was middle-aged." With the kindliest of smiles at the "old lady" in the last section of the "Seven Ages," and a glance at the handsome Consulting Room and Managing Director's Office, with their beautiful fireplaces and gas-fires, Their Majesties completed their tour through, and unexpectedly

prolonged inspection of, the Gas Exhibit—taking appreciative note of the fact that it provided a welcome resting place for tired sightseers—and passed out through the main entrance porch with a gracious word of thanks to the Chairman of the Executive.

There was a repetition of Wembley in 1925, when the Gas Exhibit occupied its old buildings, with extensions, in the palace of Industry. The scheme of the display partook of an Empire character. Again the King performed the opening ceremony; and in asking him to do so the Duke of York (who was the President that year) said the date had been chosen as being the fifteenth anniversary of the coronation of the King.

Within a very short period of the opening, the King and Queen had visited the Exhibition three times. On one occasion, while in the Palace of Industry, the Royal Party made a full inspection of the Gas Exhibit, and here the King gave gratifying evidence, by a reference to the "Seven Ages of Woman," to the lasting impression he had gained of the previous year's display.

The King and Queen at Beckton.

The Gas Industry was singularly honoured in the year 1926, which was marked by visits of Royalty on no less than three separate occasions. In July, His Majesty the King, who was accompanied by the Queen, opened a new coal handling plant at Beckton, where they were received by (then) Mr. Milne-Watson. There were also present Mr. Henry Woodall (Deputy-Governor), Mr. R. M. Holland-Martin, Col. the Hon. Clive Bigham, Mr. T. Goulden, General H. B. Hartley, and Mr. R. J. N. Neville (Directors). The Queen stood conversing with Mrs. Milne-Watson and the Deputy-Governor, while the King inspected the two companies of the Rangers' Battalion of the London Regiment, officered and manned by the Gas Light and Coke Company. Then there were presented to His Majesty the principal officials of the Company and several of the oldest employees.

It was explained by the Governor that the new coal handling plant, which was capable of unloading 2,000 tons an hour, was the largest plant for the purpose in Europe. Before pulling the lever which started the plant, His Majesty said: "I am very glad to visit this old established gas-works at Beckton, and to inaugurate the important addition to the plant, for I realize how essential the Gas Industry is to the daily life of the community."

The King, during a subsequent tour of the works, inspected one of the retort houses, where he showed himself to be much interested in the actual process of gas manufacture. Another visit was to the chemical works, where the Royal guests took tea; and it was here that the Queen, realizing the value of the various products saved by the Gas Industry, but lost when coal is consumed for heating purposes in its raw state, was said to have exclaimed: "How wasteful coal fires are," and the King to have remarked that in places where he could not have a gas fire he had successfully tried coke fires.

This memorable occasion was brought to a close at the Eastern Division Sports Ground of the Company at East Ham, where Their Majesties each planted a tree.

An Edinburgh Inauguration.

Some three months later, the Duke and Duchess of York had an interesting series of engagements in the Capital of Scotland. The chief object of the visit was the fulfilment of a previous arrangement that His Royal Highness should receive the freedom of the city. The Edinburgh Corporation also took the opportunity of the Royal visit, for the inauguration of a new vertical retort installation at their Granton Gas-Works. The inauguration ceremony was performed by the Duke; the Duchess unveiling a commemorative tablet.

H.R.H. Prince George (now the Duke of Kent) watching girls at work in a gas stove factory during his visit to Leeds in September, 1932.

Lord Provost Sleigh, before presenting His Royal Highness with a gold key for the purpose, remarked that the Gas Committee of the Corporation, under the able Convenership of Councillor James Stewart, and the Vice-Convener, Councillor Gregorson, along with the Engineer and Manager, Mr. H. H. Gracie, had been most diligent in their efforts to promote the efficiency of the undertaking. In his reply, the Duke said it was quite obvious that the people of Edinburgh had reason to be proud of their Corporation gas-works. Councillor Stewart thanked the Royal guests for their presence, and asked the Duchess's gracious acceptance of a silver bowl as a souvenir of the occasion.

The Duke having opened the door of the works, the party entered No. 2 Exhauster House, where they signed the visitors' book on a specially illuminated page, and Their Royal Highnesses were each presented by the Lord Provost with a morocco-bound copy of a brochure describing the gas undertaking. They were then conducted by Mr. Gracie over the retort house, and watched with interest the various sections at work.

The visit to Granton concluded with the Duke inspecting about 200 ex-Service men, all employees of the Gas Department.

Royal Opening of Showrooms.

The third of these memorable events during 1926 was the opening by the Duchess of York of the beautiful showrooms of the Gas Light and Coke Company in Church Street, Kensington. Here she was received by the Governor and Miss Milne-Watson. The Governor pointed out how important it was that the gas should be supplied in the best possible way and used in the best possible apparatus. It was for this reason that the Company had abandoned the old premises in High Street, Kensington, which had become inadequate to serve their purposes.

The Duchess said that, knowing what a great benefit gas was in the modern home—and especially the working home—she was delighted to associate herself with this new development in Kensington. Her Royal Highness then operated a switch that lighted up the inside lamps.

A full account of the opening proceedings which appeared in the "JOURNAL" at the time concluded thus: "This gracious act of the Duchess of York in declaring open these palatial showrooms and lecture hall, which are bound to play a worthy part in helping to bring practical assistance and advice within the reach of thousands of homes, is but one more proof that our Royal Family believe—to quote the words of His Majesty the King—that the strength of the nation lies in the homes of the people."

British Industries Fair.

From year to year our volumes have borne testimony to the great personal interest taken by Royalty in the British Industries Fair. To quote one example, it was stated in the "JOURNAL" for Feb. 29, 1928, that the Heavy Section of the Fair at Castle Bromwich had been visited by the King and Queen, who passed twice through the Gas Industries Section, and paid close attention to the various exhibits, stopping at several stands. Then, again, in 1929, the Duke of York honoured the Gas Industries Section by calling at the Central Bureau and signing the visitors' book; while in 1932 we reproduced a photograph of the Prince of Wales inspecting a gas meter, during the considerable time he spent in the same Section.

Institution Charter.

A picture showing some of the members present at a meeting of The Institution of Gas Engineers during April, 1928, was reproduced in the "JOURNAL"—the occasion being the unanimous passing of a resolution that the Council be authorized to present to His Majesty in Council a Petition in the form of a draft submitted and signed by Mr. H. D. Madden, the President, praying for the grant of a Royal Charter, which was eventually bestowed upon the Institution.

On the occasion of that meeting, the oldest member, Mr. Henry Woodall (who joined in the year 1865, when the Institution was named the British Association of Gas Managers), gave some interesting details of early happenings. He was one of the group of engineers who were responsible for the formation of the British Association of Gas Managers, though, through a curious mischance, the details of which he related, he did not happen to be present when the Association was actually formed. Years before, when asked what his ambition was, he replied: "To be President of the Gas Managers' Association, and to make the cheapest gas in Britain." He declared, amid cheers, that he had accomplished both purposes.

A Visit to Eastbourne.

During the Presidency of Mr. Frank H. Jones, the British Commercial Gas Association held their 1929 conference at Eastbourne, and a feature of that occasion was a visit of the Duke and Duchess of York (who were in Eastbourne at the time) to a conversazione in the Floral Hall of the celebrated Devonshire Gardens. The Royal visitors were accompanied by the Mayor of Eastbourne; and after the party had passed through the hall to the platform, Miss Rosemary Croft had the honour of presenting a bouquet to the Duchess.

In the course of his address of welcome, the President assured Their Royal Highness of the delight of the Association at having for their great encouragement in this varied work of national service the evidence of interest and appreciation which had been so graciously given by the Duke and Duchess. In his reply, the Duke of York said that he and the Duchess were very glad to have this opportunity of meeting so many representatives of an organization which aimed at helping employers and employees and the public alike.

Duke of York at Beckton.

The Duke of York paid a visit to the Gas Light and Coke Company's gas and products works at Beckton, and to the sports ground at East Ham, in November, 1922.

As many readers are aware, the Duke of York is exceedingly interested in welfare work, and this was one of the reasons which led His Royal Highness to visit the largest gas-works of the largest Gas Company in the world; for he wished to make himself personally acquainted with the methods by which the Company provide for the welfare of their vast number of employees.

On arrival, the Duke of York was received by the Governor of the Company (then) Mr. D. Milne-Watson, who then presented some of the prominent officials, including Messrs. T. Hardie (Chief Engineer), R. W. Foot (Assistant General Manager), W. B. Leech and E. J. Hutchence (Resident and Deputy-Resident Engineers at Beckton). The Duke shook hands, among others, with three old workmen whose joint service with the Company totalled 144 years. The inspection began at the war memorial, which bears a bronze tablet recording the names of the 500 men in the Company's service who fell during the war, and 97 of whom were Beckton men.

In the new reinforced concrete workshops (covering an area of nearly 50,000 superficial feet) Mr. Birks, and other officers more particularly concerned with the mechanical engineering side of the Company's work, were presented to the Duke, who then walked through the shop, and expressed his appreciation of the splendid conditions under which the men carried on their work. At the entrance to the tar and ammonia products works His Royal Highness was received by Mr. W. Gordon Adam, the Superintendent, and the visit concluded at the sports ground at East Ham, where the Duke planted a memorial tree.

The Prince of Wales Sees Beckton's Coke Ovens.

A battery of coke ovens costing a million pounds, installed at the Beckton Works of the Gas Light and Coke Company, was visited and formally opened by the Prince of Wales in May, 1932.

His Royal Highness flew to Hornchurch, where he was received by Sir David Milne-Watson. Driving from Hornchurch to Beckton, the Prince there inspected a Guard of Honour composed entirely of co-partners in the Gas Light and Coke Company, and belonging to "The Rangers." The Governor remarked that the Prince's visit on this occasion was another example of the great interest taken by the Royal Family in the industry of the country—a great encouragement to them in difficult times.

His Royal Highness declared that it was a matter of great interest and pleasure to him to come to this great manufacturing plant. He thought they all knew the keen interest he took in the manufacturing and business concerns of the country, and especially progressive undertakings like their own. He would like to remind them that he was a great user of gas himself, and he wanted to thank the Company for the kind help they had recently given him in this direction. He appreciated the quick and efficient manner in which the work was carried out. In these remarks, the Prince was referring to work that had recently been carried out by the Company in connection with the gas installation at his house at Sunningdale.

At a signal from the Prince, one of the coke ovens was discharged. His Royal Highness received from Sir David Milne-Watson a silver dolphin, designed and executed by Mr. Omar Ramsden, and mounted as a paper-weight, as a memento of his visit. Following the ceremony of inauguration, there was a tour of inspection, during which the Royal visitor mounted the coke oven battery and himself pushed a charge—climbing into the control cabin, from which he worked levers operating the ram machine.

Prince George Proposes "The Gas Industry."

In the autumn of 1932 the British Commercial Gas Association met in Leeds, under the Presidency of Councillor Geoffrey H. Kitson (Chairman of the Leeds Corporation Gas Committee), for their "Coming-of-Age" Annual General Meeting and Conference. It was a notable occasion, which was made the more notable by the presence at dinner of His Royal Highness the Prince George, who submitted the toast of "The Gas Industry." The dinner was in the Victoria Hall, at the invitation of the Chairman and members of the Leeds Corporation Gas Committee, and about 400 members of the B.C.G.A. and guests were present. "It is," said Prince George, "because I know how valuable a servant to the community is the Industry which you represent, and which your Association exists to serve, that I have much pleasure in proposing Many Happy Returns of the Day to the Association, and Health and Prosperity to the Gas Industry."

The receipt was announced of the following reply to a message of loyalty sent earlier in the day to His Majesty the King: "The King has received with much pleasure the message of loyalty and good wishes from the members of the conference of the British Commercial Gas Association, with whom Prince George is to dine this evening. I am commanded to convey to the President, Vice-Presidents, and members the King's sincere thanks, together with His Majesty's best wishes for a successful issue to their deliberations."

H.R.H. Prince George being received on the occasion of his visit to the reconstructed Higginshaw Gas-Works of the Oldham Corporation.

Among his other engagements in Leeds on the same occasion, Prince George made a thorough inspection of the chief departments at the Armley Works of Messrs. Wilsons and Mathiesons, Ltd., and opened new offices there.

Oldham's Centralization Signalized.

Two years ago there was completed the reconstruction of the Higginshaw Gas-Works, which formed the first stage of the Oldham Gas Committee's policy of centralizing the production at this works, and the inauguration of the reconstructed works was performed by Prince George, in May, 1933. In his speech, Prince George (who was accompanied by Lord Derby) paid a tribute to the importance of "a well-organized Gas Industry in our national life," and afterwards showed the greatest interest in the new works. The Mayor (Alderman E. Bardsley), in welcoming the Royal visitor, said that he brought to Oldham a ray of sunshine amid the clouds of industrial depression which had overwhelmed the town for so long a period.

His Royal Highness, remarking that atmospheric pollution was one of the greatest evils that menaced our national health, said that there was no doubt the increased use of gas was doing much to overcome it. "Can the average citizen imagine what this country would be like without gas?" asked Prince George. "The housewives of this country owe a great debt to the inventors and engineers of the Gas Industry. Industrially, gas provides manufacturers with a fuel on which they can place the most complete reliance. During my visits to a large number of factories, I have been struck by the great variety of ways in which gas is utilized in industry." Subsequently Prince George was conducted through the works by Mr. Frank Greenhalgh (the Engineer), to whom, it had been mentioned in the course of the proceedings, the whole works constituted a tribute.

A Tottenham Ceremony.

Towards the end of 1933, the Tottenham and District Gas Company were honoured by a visit from the Duke of York to inaugurate at the Willoughby Lane Works an installation of intermittent chamber ovens. His Royal Highness was met on arrival by Mr. Henry Woodall (Chairman of the Company) and Mr. H. C. Smith (Chief Engineer). Mr. Woodall remarked that the Gas Industry had often been referred to as a Cinderella of industries—why, he did not know, but perhaps because she had been for many years a patient and modest servant of the public. Be this as it might, that day a Prince had smiled upon them, and they, like Cinderella in the fairy story, felt all was well. The Duke replied that, being vitally interested in industry, he could not fail to be impressed by the achievements of the Company, not only on the mechanical side, but on the personal side also. He had heard with the greatest interest of their co-partnership scheme, and of the thought and outlay which they had expended on behalf of those who worked for them.

After formally inaugurating the new plant, by operating a lever which emptied a truck of coal by means of a rotary tippler, and by discharging one of the ovens, the Duke was conducted over the plant, and later His Royal Highness inspected the Tottenham Company's compressed gas driven lorry, by which he was conveyed to their recreation ground nearby.

Our Federation.

And now for one last milestone, before completing what has been a pleasant task. By whom will the tale be taken up a quarter-of-a-century hence, and, if it be taken up, what will the chronicler find to record? Such things mortals are denied the ability to foresee. It seems safe, however, to prophesy that the history of the Gas Industry during the coming years will be influenced for good by the British Gas Federation, whose Inaugural Banquet was fully reported in the "JOURNAL" at the beginning of last November. In no light spirit was it that we offered our heartiest congratulations to all who had been responsible "for the conception of a great Federation to speak with a united voice for our great Industry;" and now it is with no misgiving that we step forward towards the milestones that are to come.

Loyal Address to H.M. the King

The following is the text of a LOYAL ADDRESS of CONGRATULATIONS submitted to H.M. the King on the occasion of the Silver Jubilee of his Accession to the Throne, by the fifteen undermentioned Engineering Institutions whose Corporate Seals were affixed :—

To the King's Most Excellent Majesty.

May it please Your Majesty,

We, as representatives of, and on behalf of, the principal Engineering Institutions and Societies in the United Kingdom of Great Britain and Northern Ireland, humbly beg leave to convey to Your Majesty the Loyal Greetings and Felicitations of our 67,000 Members upon the attainment of the 25th Anniversary of Your Majesty's Accession to the Throne.

Through Your Majesty's wise and beneficent rule and encouragement of Science in Industry, the utilization of the great sources of power in Nature has been advanced to an extent unprecedented in the history of mankind, thus contributing in no small degree to the welfare of all Your Majesty's subjects.

We desire to express our deep loyalty and devotion and our high appreciation of the work Your Majesty has done towards the promotion of the Science and Art of Engineering in its bearing on the well-being of the Empire.

We pray that Your Majesty may live long to enjoy good health and happiness.

The Institution of Civil Engineers (1818).
The Institution of Mechanical Engineers (1847).
The Institution of Naval Architects (1860).
The Institution of Gas Engineers (1863).
The Iron and Steel Institute (1869).
The Institution of Electrical Engineers (1871).
The Institution of Municipal and County Engineers (1873).
The Institute of Marine Engineers (1889).
The Institution of Mining Engineers (1889).
The Institution of Mining and Metallurgy (1892).
The Institution of Water Engineers (1896).
The Institution of Automobile Engineers (1906).
The Institute of Metals (1908).
The Institution of Structural Engineers (1908).
The Institution of Chemical Engineers (1922).

The Seal of The Institution of Gas Engineers was attested by the President, Mr. C. Valon Bennett, and the Honorary Secretary, Mr. W. E. Price, and countersigned by the Secretary, Mr. J. R. W. Alexander.

Silver Jubilee Gas Floodlighting

That the Joint Co-Ordinating Committee of the National Bodies was wise in October, 1934, in appointing a 1935 Jubilee Celebrations Committee to advise Gas Undertakings as to the floodlighting by gas of appropriate buildings in Celebration of the Jubilee of the Accession of Their Majesties the King and Queen and that the consequent publication of "Floodlighting by Gas" was both timely and effective, is demonstrated by the length of the list of buildings and other places to be floodlighted by gas next week throughout the country.

The list is based upon information available up to the end of April, 1935, and supplied by the Secretary of the Committee (Mr. J. R. W. Alexander, 28, Grosvenor Gardens, London, S.W. 1).

The Gas Undertakings and makers of gas lamps responsible for arranging such a substantial amount of gas floodlighting at relatively short notice are to be congratulated on the success which has attended their response to the recommendations of the 1935 Jubilee Celebrations Committee.

Accrington.—Rishton War Memorial.
Ascot.—Ascot Racecourse (Grand Stand Clock Tower).
Basingstoke.—Deane's Almshouses.
Batley.—War Memorial.
Bideford.—Kingsley Statue.
Bishop Auckland.—Water Tower.
Blackburn.—Cathedral (East Side) and Queen Victoria's Monument.
Bolton.—Gas Showrooms.
Boxmoor.—Parish Church (Apsley).
Brecon.—Castle Hotel.
Bridgwater.—Bristol Arms Hotel.
Brighton and Hove.—Hove Old Parish Church and St. John's Church (Hove).
Burton-on-Trent.—Parish Church, St. Paul's Church, and Tutbury Castle Ruins.
Bushey.—Parish Church, Royal Masonic Junior School, and Council Offices.
Calverley.—War Memorial.
Carmarthen.—Picton Monument.
Chester.—Chester Castle.
Chorley.—Ashley Hall and Parish Church.
Cockermouth.—Town Hall.
Colne.—Library and Public Hall.
Cowes.—Northwood House.
Croydon.—Wallington War Memorial, Carshalton Ponds and Gardens, and Gas Showroms (Wallington).
Droitwich.—Parish Church.
Dundee.—High School and Broughty Castle.
Exeter.—Cathedral (Front) and University College (Washington Singer Laboratories).
Folkestone.—Kingsnorth Gardens and Hythe Parish Church.
Gloucester.—St. Michael's Church.
Hampton Court.—Teddington Memorial Hospital, Teddington War Memorial, and Gas Showroom (Hampton Wick).
Harpenden.—Council Offices.
Hastings.—Memorial Clock Tower.
Hatfield.—Council Offices.
Huddersfield.—Railway Station (Front) and St. Peter's Parish Church.
Kidderminster.—Richard Baxter Statue.
Lancaster.—Parish Church, Castle Gate, and Aston Memorial School.
Leeds.—Templenewsam.
Leek.—Parish Church.
Leigh.—War Memorial.
Lincoln.—Gas Showrooms, Employment Exchange, Lindsey C.C. Offices, and St. Mary's Church.
London.—St. James's Park, Oxford and Cambridge Club, St. Mary Abbots Church, Kensington, Town Hall, Hendon, Public Library, Hendon, Central Fire Station, Hendon, War Memorial, Hendon, St. Mary's (Parish) Church, Putney, Council House, Wandsworth, Holy Trinity Church, Wandsworth, and Wandsworth Parish Church.
Manchester.—Cenotaph and Art Gallery.
Melrose.—War Memorial.
Middleton.—Parish Church and Ye Olde Boar's Head Inn.

Moffat.—Star Hotel.
Monmouth.—Geoffrey's Window.
Newcastle-on-Tyne and Gateshead.—Hancock Museum and Central Mission (Gateshead).
Newtown.—War Memorial.
Northwich.—Bull Ring.
Perth.—Mercat Cross.
Plymouth.—Devonport Park Gardens.
Portsmouth.—Southsea Terrace.
Radlett.—Parish Church.
Rhyl.—Promenade Gardens.
Rickmansworth.—War Memorial and Royal Masonic School.
Rochdale.—Museum.
St. Albans.—Clock Tower.
St. Austell.—Public Gardens.
St. Helens.—Cowley School.
Sheffield.—Gas Offices.
Silsden.—Farm House.
Southgate.—Church Hall.
Sowerby Bridge.—Crow Wood Park.
Spalding.—Ayscoughfee Hall and Pinchbeck Hall Gardens and Lawn.
Stalybridge.—Coal Tower (Gas-Works).
Stockport.—War Memorial, Sunday School, and St. George's Church.
Stoke-on-Trent.—Stoke Town Hall, Longton Town Hall, and Trentham Parish Church.
Stratford-upon-Avon.—Gower Monument of William Shakespeare.
Stretford.—Town Hall and Urmston Public Baths.
Tyldesley.—War Memorial.
Walsall.—The Arboretum.
Warrington.—Fountain (Bank Park) and O'Leary Monument.
Warwick.—Warwick Castle.
Watford.—Peace Memorial Hospital.
West Bromwich.—Parish Church and Dartmouth Park Memorial.
Whitby.—Gas Showrooms.
Wigan.—The Square.
Wolverhampton.—Roman Catholic Church.
Wombwell.—Town Hall and War Memorial.
York.—York Minster: North Tower (West Front), North Nave, Chapter House and Vestibule, North Transept, and North Choir; Treasurer's House, Minster Court, Deanery, City Walls (Dean's Park), Minster Library, and War Memorials.

Personal

A signal honour has come to the British Gas Industry in the award to Mr. F. J. West, C.B.E., of the Walton Clark Medal, 1935. Details of the award will be found on p. 271.

* * *

Mr. F. Allen, B.Sc., who has been Manager and Secretary of the Carmarthen Gas Company, has been appointed Co-ordinating Engineer to the South-Western Gas and Water Corporation, Ltd., with his headquarters at Dorchester. In this capacity his work has been to increase gas sales, and has included the taking over of a small adjacent undertaking and the complete reconstruction of the works, culminating in the erection of an installation of Woodall-Duckham continuous vertical retorts, which will be put into operation in about a month's time. They have also been successful at Dorchester in re-entering the public lighting field after thirteen years' monopoly by electricity. Mr. Allen is a native of Keighley (Yorks.) and proceeded from Keighley Grammar School to Leeds University.

* * *

Mr. Allen's successor at Carmarthen is Mr. K. E. Tiddy, who takes over the duties of Manager and Secretary on June 1 next. Mr. Tiddy has been Engineer and Manager to the Haverfordwest Corporation Gas Department.

* * *

His old friends in the Industry will be interested to know that Mr. F. W. J. Belton is home on leave from New Zealand. It will be remembered that Mr. Belton left Macclesfield nearly 11 years ago to take up the Engineership of the Christchurch Gas, Coal, and Coke Company, Ltd.

* * *

The Bolton Corporation Gas Committee has appointed Mr. Harold Platt, Superintendent of the Gas Street Works, as Assistant Gas Engineer in place of Mr. C. H. Bamber, who has become Gas Engineer at Rochdale. Mr. Donald Benson, M.L.Str.E., Superintendent of the Lum Street Works, is appointed to fill Mr. Platt's position at Gas Street.

* * *

Mr. E. Field, of the North Middlesex Gas Company, has been appointed Distribution Manager to the Tunbridge Wells Gas Company in succession to Mr. Donaldson.

Obituary

The death has occurred of Mr. W. A. Surridge, of 167, Auckland Road, Upper Norwood, in his eighty-fifth year. He was for many years Chairman of the Herne Bay Gas Company and also a Director of the Tottenham and many other Gas Companies. For over forty years he was connected with E. Foster & Co., Coal Contractors, of which firm, for some years previous to his retirement, he was Senior Partner. Mr. Surridge was a prominent freemason, having attained the rank of P.A.G.D.C. He entered the Evening Star Lodge as a joining member as long ago as 1897, and was Master in 1910. He was also P.M. of the Eclectic Lodge No. 1201 and of the Anerley Lodge No. 1397.

Forthcoming Engagements

May.

3.—North of England Association.—Annual Meeting at Newcastle-upon-Tyne. Paper by Mr. T. P. Ridley.
3.—London and Southern Junior Association.—Annual Business Meeting.
3.—Wales and Mon. Junior Gas Association.—Annual General Meeting at Cardiff, 6.45 p.m.
4.—I.G.E.—Examinations in Gas Supply.
7.—I.G.E.—Research Executive Committee, 2.30 p.m.
8.—I.G.E.—Sir Arthur Duckham Memorial Fund Executive Committee, 2.30 p.m.
11.—Scottish Junior Association (Eastern District).—Annual General Meeting. Paper by Mr. D. L. Dickson.
13.—I.G.E.—Finance Sub-Committee, 1.45 p.m.; Membership Sub-Committee, 2.15 p.m.; General Purposes Committee, 3 p.m.
14.—I.G.E.—Council Meeting, 10 a.m.; Gas Education Executive Committee, 4 p.m.
14.—N.G.C.—Annual General Meeting, Hotel Metropole, W.C. 2, 2.30 p.m.
15.—S.B.G.I.—Council Meeting, 11.15 a.m.; Annual General Meeting, Hotel Metropole, 2.45 p.m.
15.—B.C.G.A.—Meeting of the Executive Committee, 11 a.m.; General Committee, 2.30 p.m.
15-16.—Eastern Counties Gas Managers' Association.—Spring Meeting at Stamford.
16.—B.C.G.A.—Yorkshire District Conference at York.
16.—Midland Association.—Spring Meeting at Hereford.
18.—Yorkshire Junior Association.—Meeting and Paper by Mr. C. A. Newham.
22.—British Gas Federation.—Luncheon at B.I.F., Birmingham.
29.—B.C.G.A.—Midland District Conference at Worcester.

June.

3.—I.G.E.—Finance Sub-Committee, 1.45 p.m.; Membership Sub-Committee, 2.30 p.m.; General Purposes Committee, 3.15 p.m.; Council Meeting, 4.30 p.m.
4-7.—I.G.E.—Annual General Meeting in London.
11.—I.G.E.—Gas Education Executive Committee, 4 p.m.
19.—Association of Statutory Inspectors of Gas Meters.—Annual General Meeting, County Hall, Westminster, 10.15 a.m.
20.—I.G.E.—Refractory Materials Joint Committee, Stoke-on-Trent, 2.30 p.m.
22.—London and Southern Junior Association.—Summer Visit to Winchester.
25.—Southern Association.—Visit to Guildford.
26.—I.G.E.—Oral Examinations in Gas Engineering and Gas Supply, Board of Examiners, 9.30 a.m.

Correspondence

Cost of Gas Appliances

SIR,—I have read with great interest your remarks on the "Cost of Gas Appliances" which appeared on page 88 of your issue of April 10.

I feel sure that your views will be endorsed by every manufacturer of gas appliances and every gas engineer who takes a long view of the subject. Unfortunately the value of quality is not always sufficiently appreciated by the salesman, who thinks more in terms of "sales"—obviously more facilitated by a low-priced article—than the service to the consumer, which must be the ultimate object of the Gas Industry. Electrical competition cannot be met by favourable tariffs and propaganda alone, but must be fought with equal energy by constant efforts towards greater perfection and efficiency of gas appliances. Manufacturers have done their best in the past to supply the Gas Industry with serviceable apparatus, and must continue to do so in the future. On the other hand, undue conservatism should not prevent ready adoption of new and improved designs, and endeavours in this respect should not be handicapped because "the old ones have always fulfilled their purpose." This argument in the long run means falling behind.

It has recently been suggested that there is a need for an immersion heater which could be built into existing hot water tanks like the electric immersion heater. It is doubtful, however, whether a gas immersion heater could be obtained at a low price if trouble-free operation and a high thermal efficiency are to be guaranteed. Every engineer knows, for instance, how difficult it is to prevent condensation in a gas heater lying in cold water, and yet this must be prevented if the heater has to have a long life.

In my opinion it is a foolish undertaking to copy electric appliances, with their inherent faults. Gas appliances must be designed independently so that full advantage can be taken of the excellent characteristics of this fuel. This has been done in the instantaneous water heater. Electricity cannot compete with gas for instantaneous water heaters. The different characteristics of the two fuels should be borne in mind in connection with the design of auxiliary heaters for existing hot water supplies.

A circulator shows the same characteristics as the storage system, and especially the loss of heat through radiation and circulation, a point which is not always fully realized. It may even happen that when the boiler or kitchen range is not in operation the circulation is reversed, and the hot water coming from the gas circulator is cooled in the boiler or range by the cold air drawn up the chimney. Therefore a satisfactory economy is only obtainable when the price of gas is low.

An improvement in this direction would be a device acting on the principle of the instantaneous heater. It must be installed in the hot water circuit at the outlet of the hot water tank and must be controlled by a thermostat in such a way that it automatically comes into operation on the opening of a tap when the temperature in the tank falls below a certain minimum. The thermostat in this case must control the flow of water and not the gas supply, as in the storage heater, so that the temperature of the water at the tap remains constant irrespective of the temperature in the storage tank.

The design of such an apparatus naturally presents certain difficulties. For instance, as the water entering the heater may already be hot, the apparatus must allow a sufficiently large volume of water to pass through it so that its outlet temperature may not become too high. These difficulties, however, do not seem insuperable, and it is likely that the near future may see an apparatus of this type, which would ensure an unlimited supply of not tepid, but really hot water, at all times. On account of the absence of radiation and circuit losses the system would have a high thermal efficiency and would be an economic proposition even though the price of gas was high. Above all, the fact that it is impossible to design any electric heater on similar lines would preserve the field of auxiliary heating for existing hot water supplies mainly for gas.

Yours, &c.,

April 26, 1935. W. M.

Gasholder Inspection

SIR,—The very interesting letter of your correspondent, Mr. Paul C. Rodgers, Vice-President of Stacey Brothers, Cincinnati, is of considerable importance inasmuch as it shows that gasholder inspection is having serious attention in the United States and Canada. Its importance is further emphasized by the indication it gives of one of the methods they have adopted to ascertain the nature and extent of deterioration of the metal in the roof sheeting. As the coupons mentioned were taken from "old gasholders" we may assume that the material was wrought iron.

Some little time ago I took from the intermediate sheeting of the roof of a three-lift gasholder of 1½ million cu.ft. capacity, and built in 1872, a piece of the original sheeting which registered on the micrometer 0·0783 in. thickness. This was wrought iron and 14 in. square; strips were cut from the edges so as to provide one strip each way of the grain. A square of 9 in. was left after the strips were taken. On being pulled the two strips registered a tensile strength of 15·7 and 19·5 tons per sq. in. This gave the required clue to the way the sheet had been rolled, and confirmed the expectation that the long way of the sheet was the direction of rolling. With this information the 9 in. square was bent in the more favourable direction over a 3-in. round bar by pressing, not hammering, after the side edges had been filed round to prevent premature cracking there. It was thought that this comparatively easy bending would favour the crystallized places and cause rupture to commence there as it brought a greater field of disturbance into test than would be the case were a more sudden and restricted bend made. The cracks commenced at the edges almost simultaneously after being bent three times each way. They travelled across at about even speed but at points about ⅛ in. each side of a centre line marked on the piece. After being bent nine times each way the cracks had reached half way across the piece and would have divided it in two had they been opposite. Very little crystallization was perceivable in these fractures, but when the remaining halves were broken in a vice they revealed rather more.

This type of test is very instructive and necessary if one is to know the present strength of a gasholder roof sheeting which is of considerable age. Its value as an indication of the nature and extent of deterioration of the metal is, however, quite another matter. To serve any really useful purpose in this direction one must know what the quality and structure were when originally made, and this can only be very roughly approximated.

If wrought iron is specified for gasholder sheeting now it is usual to insist on a quality equal to "B.B.B." How are we to ascertain the original quality, or thickness, of sheeting in "old holders?"

It would be of inestimable advantage if, while still exercising care and investigation into the condition of our older gasholders, we scrutinized the details, especially sheet thicknesses, of new ones. Some are supplied with sheets forming one wall of the cups which cannot possibly last one-third the expected life of the gasholder as a whole.

Another common cause of weakness is to load the roof sheeting beyond what it was originally supplied for, by making two-lift gasholders into four-lift, by adding lifts inwards, and reducing the roof sheeting by cutting away the strong plates from its outer edge.

Yours, &c.,

LEONARD BOTT.

Granville Villas,
Newport, Shropshire,
April 27, 1935.

P.S.—May I be permitted here to make two corrections in the report of the discussion following my Paper on gasholder inspection in your issue of April 10?

The jointing material I recommended was one-third Scott's cement and two-thirds red lead.

With regard to red lead paint, I did not say it needed a binding material, but that it acted as a binder for subsequent coats of paint.

L. BOTT.

Institution of Gas Engineers

Members of The Institution of Gas Engineers are invited to attend the Annual General Meeting of the Illuminating Engineering Society which will be held in the Hall of the Institution of Mechanical Engineers, Storey's Gate, St. James' Park, S.W. 1, at 7 p.m., on May 14. An Address describing some investigations bearing on the production of light will be delivered by Professor Dr. M. Pirani (Berlin). Admittance tickets may be obtained from the Secretary, The Institution of Gas Engineers, 28, Grosvenor Gardens, S.W. 1.

Institution of Gas Engineers

Advance Programme of June Meeting

President: C. Valon Bennett

Tuesday, 4th June, 1935.

a.m.

ADDRESS OF WELCOME by the President (C. Valon Bennett) to the representatives of Overseas Gas Associations and members present from abroad.

Secretary to read GREETINGS from Overseas Gas Associations.

Presentation of MEDALS:—

INSTITUTION GOLD MEDAL, 1934: Awarded to Engineer-Captain J. FRASER SHAW, R.N. (Ret'd.), and Dr. J. G. KING, B.Sc., F.I.C. (London), for Joint Paper, "Recent Experiments at the Fuel Research Station upon Production of Solid Smokeless Fuel," read at the 71st Annual General Meeting of The Institution of Gas Engineers in London, on 5th June, 1934.

H. E. JONES LONDON MEDAL, 1934: Awarded to D. B. PARKINSON, M.A., M.Inst.Gas E. (London), for Paper, "Modernizing Small Gas Undertakings," read at the 71st Annual General Meeting of The Institution of Gas Engineers in London, on 7th June, 1934.

INSTITUTION SILVER MEDAL, 1934: Awarded to F. B. RICHARDS, M.B.E., M.Inst.C.E., M.I.Mech.E., M.Inst.Gas E. (London), for Paper, "Perspective in Carbonizing Costs," read at the Autumn Meeting of the Eastern Counties Gas Managers' Association in London, on 25th October, 1934.

INSTITUTION BRONZE MEDAL, 1934: Awarded to H. D. SULLIVAN (Plymouth), for Paper, "Economic Considerations of Gas-Fired Central Heating," read at the Meeting of the Western Junior Gas Association in Taunton, on 1st December, 1934.

30 a.m.

(a) PRESIDENTIAL ADDRESS by CHARLES VALON BENNETT, M.Inst.Gas E., Engineer, General Manager, and Secretary, The Rochester, Chatham and Gillingham Gas Company. (*Communication* No. 108.)

(b) VOTE OF THANKS for the Presidential Address.

a.m. to 12 noon.

(a) PAPER on "National Policies Governing the Testing of Gas Appliances," by STEPHEN LACEY, B.Sc., M.Inst.C.E., M.Inst.Gas E., Controller of Gas Sales, and C. A. MASTERMAN, M.A., F.I.C., Chief Technical Officer, the Gas Light and Coke Company. (*Communication* No. 109.)

(b) DISCUSSION.

Adjournment.

15 p.m.

PHOTOGRAPH of Members and Guests attending the 72nd Annual General Meeting of The Institution of Gas Engineers, to be taken on the Horse Guards Parade, St. James' Park, London, S.W. 1.

45 to 2.30 p.m.

PRESIDENT'S LUNCHEON in the Ballroom of the Savoy Hotel, Victoria Embankment, London, W.C. 2.

p.m.

Resumption.

(a) PAPER on "Problems and Answers in the Reconstruction of Manufacturing and Distribution Plant, Nottingham," by GEORGE DIXON, B.Eng., Assoc.M.Inst.C.E., M.Inst.Gas E., Engineer and Manager, City of Nottingham Gas Department. (*Communication* No. 110.)

(b) DISCUSSION.

p.m.

(a) PAPER on "The Gas Account," by W. B. MCLUSKY, M.Inst.Gas E., Engineer and Manager, Halifax Corporation Gas Department. (*Communication* No. 111.)

(b) DISCUSSION.

to 5.15 p.m.

To receive the report of the Scrutineers of the BALLOTS for the election of:—

(a) Officers, Auditors and Ordinary Members of Council and

(b) Honorary Members, Members, Associate Members, and Associates.

To report the names of the DISTRICT MEMBERS OF COUNCIL nominated by the affiliated District Gas Associations of the Institution, for the year 1935-36.

Adjournment.

p.m. to 2 a.m.

RECEPTION AND DANCE in the Ballroom of the Park Lane Hotel, Piccadilly, London, W. 1.

Reception by the President and Mrs. C. Valon Bennett, from 9 to 9.30 p.m.

Wednesday, 5th June, 1935.

a.m.

(a) PAPER on "Development of Gas Sales: Policy and Performance," by SAMUEL B. CHANDLER, M.Inst.Gas E., Distribution Superintendent, Tottenham and District Gas Company. (*Communication* No. 112.)

(b) DISCUSSION.

Adjournment.

a.m.

GENERAL MEETING of the CONTRIBUTORS to THE BENEVOLENT FUND of THE INSTITUTION OF GAS ENGINEERS.

Resumption.

11.15 a.m. to 12 noon.

LECTURE on "The Auxiliary Use of Carburetted Water Gas," by ARTHUR G. GLASGOW, D.Sc., D.Eng., M.Inst.C.E., Chairman, Humphreys & Glasgow, Ltd.

Adjournment.

12.50 to 6.34 p.m.

Visit to the ROCHESTER WORKS OF THE ROCHESTER, CHATHAM AND GILLINGHAM GAS COMPANY.

Ladies' Visit to ROCHESTER CATHEDRAL.

Thursday, 6th June, 1935.

10 a.m.

(a) PAPER on "Waste Heat Recovery from Retort Settings," by Major W. GREGSON, M.Sc., M.Inst.C.E., M.I.Mech.E., Technical Director, Spencer-Bonecourt, Ltd. (*Communication* No. 113.)

(b) DISCUSSION.

11 a.m.

(a) PAPER on "The Preparation, Marketing, and Utilization of Coke," by W. L. BOON, Manager, London and Counties Coke Association. (*Communication* No. 114.)

(b) DISCUSSION.

12 to 12.15 p.m.

Closing Business.

12.45 to 2 p.m.

COUNCIL LUNCHEON TO THE PRESIDENT in the Tudor Room of the Park Lane Hotel, Piccadilly, London, W. 1.

2 to 6 p.m.

Visit to the BATTERSEA POWER STATION of the LONDON POWER COMPANY, LIMITED.

Visit to the WANDSWORTH WORKS of the WANDSWORTH AND DISTRICT GAS COMPANY.

2 to 6.30 p.m.

Ladies' Visit to HAMPTON COURT PALACE.

Friday, 7th June, 1935.

KENT TOUR.—*Victoria—Margate—Canterbury—Victoria.*

Inauguration of an International Exchange of Gas Advertisements

The recommendation in the British Report presented by the President of The Institution of Gas Engineers at the 2nd International Gas Conference in Zurich in September, 1934, that an International Exchange of Gas Advertisements should be established, has been adopted by the Council of the International Gas Union.

The scheme—probably the first of its kind to be inaugurated in any National Industry—provides that each National Gas Association constituting the International Gas Union shall send to each of the other member Associations specimens as issued of its publicity material—including posters, literature, newspaper advertisements, display schemes, showcards, and novelties—with the necessary explanatory notes as to its use. In Great Britain effect will be given to the scheme by the B.C.G.A.

The objects to be achieved are best expressed in the relevant paragraph of the above-mentioned Report, which itself contained reproductions of the gas advertisements of France, Germany, Great Britain, Holland, and U.S.A.:

> "Many of the ideas used in local gas advertising are capable of universal application. It is suggested therefore that this International Conference may appropriately consider the establishment of an international exchange of gas advertisements. Each country would periodically circulate copies of its advertising matter to the national organizations or leading gas undertakings of other countries. By this means a common fund of advertising ideas, constantly replenished, would become available to all gas advertisers. In the result we might reasonably expect even more freshness in the treatment of gas advertisements. No complicated organization would be necessary to effect this constant interchange of advertising material, which is all directed ultimately to the same object of selling gas. Finally, the scheme would have the advantage of making every advertising man in the Gas Industry take a wider view of the scope and ramifications of our common business."

The next meeting of the Council of the International Gas Union will be held in Paris on May 4. and will be attended by the British representatives, Mr. C. Valon Bennett and Mr. J. R. W. Alexander.

News in Brief

Twenty-Four Gas Lamps, giving a total of 132,000 c.p., are to illuminate Manchester's Art Gallery and the Cenotaph during the Jubilee festivities.

Two Motor Vehicles belonging the the municipal gas-works authorites of Leipzig, Germany, have recently been experimentally adapted to run on town gas.

Capital Expenditure of £89,000 has been recommended by the Salford Finance Committee for reconstructing and modernizing part of the plant at the gas-works.

The Recent Issue of the £30,000 of the Weston-super-Mare and District Gas Company 4% preference stock was fully subscribed; tenders ranged from £166 10s. to £102%.

The Manchester Gas Department have been giving gas cookery and washing demonstrations, and exhibitions of cookers and accessories at the Moston Conservative Club during the past week.

Jubilee Floodlighting.—Newburgh (Fife) War Memorial is to be floodlighted at the expense of the local Gas Company in connection with the Jubilee Celebrations. The Johnstone Gas Department are also to floodlight the local War Memorial.

An Increase of 6·2% in the amount of gas sold during the past year is recorded by the Sittingbourne and Milton Gas Department. The Undertaking have received sanction to borrow the sum of £1,750 for extension of mains to the villages of Iwade and Bobbing.

The Sales of Gas by the Compagnie du Gaz de la Region de Charleroi (Belgium) last year reached a total of 447,105,000 cu.ft.—an increase of 2·8% over 1933. The number of consumers being supplied at the end of 1934 was 24,259, as against 23,339 at the close of the preceding year.

A Scheme for Floodlighting all the public and ancient buildings, public walks, and pleasure grounds by way of celebrating the Jubilee has been decided upon by the Chester City Council. This scheme, on which £3,400 is to be spent, includes the floodlighting by gas of the Castle and Cathedral.

H.M. the King has conferred his Patronage on the 54th Annual Meeting and Conference of the Society of Chemical Industry which is to take place in Glasgow from July 1-6. This congress is one of the outstanding scientific events of the year and brings together many scientists from all parts of the world.

A Proposal to Experiment on Perth Road with gas and electric street lighting was turned down at Dundee Police and Lighting Committee on April 22. The councillors will be able to judge the relative merits of the two forms of lighting, however, for it was decided to install gas lighting in a part of Perth Road which already has electric lighting.

A Scheme to Reconstruct and Modernize plant at the Gas-Works at an estimated cost of £19,000 has been decided upon by the Aberdeen Corporation Gas Committee. Retort House No. 1, consisting of 20 5-ton retorts, is to be replaced by 20 6½-ton retorts, which will increase the production. Other alterations will be made, including the provision of a heavier bucket conveyor.

The Increase in the Output of Gas at Inverness during the past few years was commented on at an exhibition of gas cooking and heating appliances opened by Provost Hugh Mackenzie. It was stated that since 1920 the consumption of gas in the town had been doubled. In 1920 the consumption was 94 million cu.ft., while this year the estimated output was 188 million. The total number of consumers in Inverness is 6,400. The exhibition was held under the auspices of Inverness Town Council.

Switch Control for Gas Lighting is being energetically followed up by other gas undertakings besides Croydon, to the successful inauguration of whose scheme we referred in last week's "JOURNAL." During the last few years 275 houses have been erected in the area of the Kelty Gas Company. Of these 215 have been fitted throughout with "Newbridge" gas switches, which are understood to be giving every satisfaction. The remaining 60 houses were erected prior to the introduction of "Newbridge" switches, and these, therefore, have not been fitted up to the present. However the Gas Company are now contemplating fitting switches in these 60 houses at their own expense and putting into practice their slogan "Gas Lighting means Switch Lighting."

Gas of a Declared Calorific Value of 460 B.Th.U. w be supplied by the Congleton Gas Department as fr Oct. 1, 1935.

A Striking Easter Window Display was arranged the Parkinson Stove Company, Ltd., at their Lond Showrooms, Terminal House, Grosvenor Gardens. T centre-piece incorporated a photographic cut-out of "Easter Bride," which can be supplied by the Compa for use in gas undertakings' displays.

Members of The Institution of Gas Engineers are vited to be present at a Lecture on "The History and struction of the Iraq Pipe Line," to be given by Sir Jo Cadman, G.C.M.G., President-Elect of the Institute Fuel, in the Lecture Theatre of the Institution of Electri Engineers, Savoy Place, Victoria Embankment, Lond W.C. 2, on May 21, at 6 p.m. The Lecture will be ill trated by lantern slides and cinematograph films show the nature of the country traversed, the mechanical pliances used, and the pumping stations constructed.

A Comparative Review of lighting and heating con tions in 1910 and to-day has been issued from the Ed burgh Corporation Gas Department. In 1910 some 92, householders made use of the "spirit of coal," each hou hold using on an average 20,700 cu.ft. The outstandi debt of this Department was then over £2,000,000. To-d 123,500 householders and industrialists are using gas Edinburgh, each averaging 27,200 cu.ft. per annum. the same time, the outstanding debt charges of the Department are less than half what they were in 1910.

That the Negotiations for the acquisition of t Abergele Gas Undertaking were successfully completed w reported at a recent meeting of the Rhyl Urban Coun The Board of Trade has approved of a provisional or for the transfer of the Undertaking, and also for the tension of the gas area of supply to include the Parishes St. George and Bodelwyddan. The Order is now awaiti confirmation. All arrangements have been made to co mence the laying of the new main to Abergele and t supply to Kinmel Bay immediately the Order is confirm

Hydrogenation of Creosote.—Pending the completi of the erection of the plant for the direct hydrogenation coal, the first shipment of petrol, some 300,000 gallo produced by the hydrogenation of creosote at the Billi ham plant of Imperial Chemical Industries, Ltd., w loaded into the s.s. "Otterhound" at Billingham April 9. The petrol is being delivered to the Shell-Me B.P. Company, who, with the Anglo-American Compa are undertaking distribution on behalf of the produce and this delivery initiates regular traffic between Billi ham and East Coast ports.—From *Chemistry and Indust*

Gas Cookery Demonstrations were organized recent by the Chichester Gas Company in conjunction with Radi tion, Ltd. There was a special opening ceremony, at wh the Mayoress (Mrs. C. C. Allen) officiated, supported the Chairman (Mr. T. N. Ritson) and the General Manag and Secretary (Mr. Ellis). Mr. Ellis referred to the launc ing of a scheme to enable consumers to purchase an a enamel "New World" cooker at terms from 1d. per da The demonstrations were given twice daily by the Radi tion Lecturess, Miss E. S. Price, and one of the featur was the cooking of a full course dinner entirely in the ov under "Regulo" control. In addition, the Gas Compa organized a Cake-Baking Competition, which attracted fewer than 110 entries.

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Page 2. ABERGELE Undertaking acquired by Rhyl U.D.C.

Page 2. ALTRINCHAM. F. A. West appointed E. & M. vice H. R. S. Williams, deceased.

Page 14. CARMARTHEN. K. E. Tiddy appointed M. & S.

Page 24. EDENBRIDGE. J. Briggs appointed M. & S. vice C. Chea ret rcd.

Page 30. HAVERFORDWEST. K. E. Tiddy, E., M., & S., resigned

Page 48. NEWARK. W. H. Blundstone appointed E., M. & S. vice F. A. West, resigned.

Page 62. SOUTH METROPOLITAN GAS COMPANY. A. Stokes Jt. M., retired.

Page 72. WESTERHAM. J. Briggs appointed M. & S. vice C. W. Hooker, retired.

Historic Castle Floodlighted by Gas

Many of our readers will have noticed in *The Times* of a week or so ago, a very fine photograph of the floodlighting of Warwick Castle. Unfortunately, however, they omitted to point out that this was carried out by gas. Above we reproduce the photograph of this installation, which represents a remarkably fine achievement by the Warwick Gas Company.

Award of Walton Clark Medal, 1935

Honour to Mr. F. J. West, C.B.E.

The Franklin Institute of the State of Pennsylvania in the United States of America, on the recommendation of its Committee on Science and the Arts, has awarded the Walton Clark Medal, 1935, to Mr. Frederick Joseph West, C.B.E., J.P., M.Inst.C.E., M.I.Mech.E., M.Inst.Gas E., Chairman and Managing Director, West's Gas Improvement Company, Ltd., of Manchester, his name having been submitted by the Council of The Institution of Gas Engineers.

The Medal has been awarded to Mr. Frederick J. West "in consideration of his outstanding service to the Gas Industry in the sphere of improved scientific development of gas-works practice and technique and practical gas research as applied particularly to the carbonization of coal in vertical retorts, and for his work in the training and education of engineers and his success in promoting amicable relationships between employer and employed, all of which have been of substantial value to the Manufactured Gas Industry."

The Regulations governing the award of the Medal state, *inter alia:* "On November 30, 1926, the United Gas Improvement Company of Philadelphia presented to the Franklin Institute a sufficient fund to permit of the award, not more frequently than once a year, of a Gold Medal, to be known as the Walton Clark Medal, 'to the Author of the most notable advance in knowledge, or improvement in apparatus, or in method, concerning the science or the art of Gas Manufacture, or distribution or utilization in the production of illumination or of heat, or of power.' The obverse of the Medal bears a profile relief of Dr. Walton Clark, and is inscribed around the margin, 'The Walton Clark Medal.' The reverse bears the legend 'awarded by the Franklin Institute to —— for original and notable work in the Gas Industry.'"

The Medal has been previously awarded to Walton Clark (1926), Arthur Graham Glasgow (1928), William H. Gartley (1929), Henry Latham Doherty (1930), Daniel J. Young (1931), and Philip T. Dashiell (1932). The Medal was not awarded in 1927, 1933, and 1934.

It is interesting to observe that members of The Institution of Gas Engineers will have an opportunity of greeting at their 72nd Annual General Meeting two of the few recipients of this outstanding award—namely, Dr. Arthur G. Glasgow, who will be lecturing at the Meeting on "The Auxiliary Use of Carburetted Water Gas," and Mr. Frederick J. West, an Honorary Member and the son of a former President of the Institution.

Sir Arthur Duckham Memorial Fund

A Meeting of the Executive Committee of the Sir Arthur Duckham Memorial Fund will be held in the Council Chamber of The Institution of Gas Engineers, 28, Grosvenor Gardens, London, S.W. 1, on May 8, at 2.30 p.m.

At this Meeting the Fund will be closed and instructions given for the preparation of a Trust Deed dealing with, *inter alia*, the making from time to time of the "'Duckham Research Award' for the period and purpose of specified investigations of interest to the Gas Industry, at places, at home or abroad, selected as being appropriate for the conduct of each particular investigation."

We are informed by the Hon. Secretary and Treasurer (Mr. J. R. W. Alexander) that the balance available on April 30, 1935, was £10,728 12s. 2d., consisting of £10,500 in 3½% Conversion Stock and £228 12s. 2d. in cash. The market value of the Conversion Stock increased from £10,500 at the times of purchase to £11,246 5s. on Dec. 31, 1934.

The total income of the Fund to April 30, 1935, was £10,908 18s. 6d., being £10,636 17s. 11d. in Donations (net), £268 13s. 6d. in Interest on Investments, and £3 7s. 1d. in Interest on Deposit Account. The total Expenditure to the same date was £180 6s. 4d.

It is estimated that the gross income of the Fund will be approximately £355 per annum.

What is a "Gasometer?"

Not only Engineers who are contemplating additions to their storage capacity or repairs or extensions to their existing equipment, but also everyone who is interested in the evolution of the gasholder, may spend an interesting and profitable time turning over the pages of a new gasholder brochure lately published by Messrs. Clayton, Son, & Co., Ltd., of Leeds.

The brochure commences with a reprint of an article from *John o' London's Weekly*, which many of our readers may remember appeared early last year under the title we have chosen for this note. It contains some interesting and amusing comments by one outside the Industry, after discussing the subject with a gas expert. The writer, it will be recalled, agrees that the correct technical term is "gasholder," though he has never yet heard a member of the ordinary public speak of it as such. Nor does he particularly admire the name, which seems to him somewhat crude and insufficient. Anything that holds gas, he suggests, might be so described—from a balloon to a syphon; and he would have expected a more distinctive word, less "coldly correct and critically dull." Here, perhaps, lies scope for

the attention of our "Technical Committee on Gas Industry Terms."

There follows a brief record of the evolution of the gasholder from 1688 to 1934, being a chronological list of important developments in respect to apparatus for the storage of gas from the time when the Rev. John Clayton discovered that the distillation of coal produced an illuminating gas which could be stored for future use—and for this purpose he utilized bladders.

The pages of the brochure which follow describe and illustrate various types of gasholder work carried out by Claytons, including extensions, alterations, and repairs, while a final section deals with corrosion and the use of genuine puddled wrought-iron sheets for gasholders, which the firm suggest is well worth the careful study of Gas Engineers as a means of resisting corrosion troubles. Finally, a useful series of tables is incorporated showing the sizes of various capacities of frame-guided, spiral-guided, and waterless (M.A.N. type) holders up to 12 million cu.ft.

Amalgamation and Grouping

Gas Consolidation Share Issue.

Gas Consolidation, Ltd., a holding company formed by Dawnay Day & Co. last June, are offering to-day for public subscription £250,000 of 4% redeemable cumulative preference shares of £1 each at par, and £50,000 of ordinary shares of £1 each at 22s.

This is the third large holding company formed to bring about geographical groupings of contiguous gas undertakings in the provinces with which Dawnay Day & Co. have been associated. The others are South-Eastern Gas Corporation and Severn Valley Gas Corporation.

Gas Consolidation, Ltd., have a share capital of £500,000 equally divided into 4% redeemable cumulative preference shares and ordinary shares. Of this share capital £200,000 ordinary shares were issued last July at par for cash. The balance of the ordinary shares and the whole of the preference shares are now being issued.

The Company have been carrying on business since last July, and now own investments valued at £313,000, which include a substantial holding in the deferred shares of Severn Valley Gas Corporation and controlling interests in three supply companies whose areas are contiguous: Cannock District Gas Company, Ltd., Lichfield Gas Company, and Tamworth Gaslight and Coke Company. Negotiations are proceeding for the purchase of similar investments which, the Directors anticipate, will produce an average yield of at least 4½% gross. It is intended to employ the £180,000 surplus funds produced by the new issue for this purpose.

The net annual revenue, derived from the gas investments, is estimated after all administration and other charges at £23,486, which is sufficient to cover the preference dividend 2·34 times, and leave a balance available for the ordinary equivalent to 5·39%.

The Chairman of the Company is Major Julian Day, who is a Director of South-Eastern Gas Corporation and Chairman of Severn Valley Gas Corporation. The Directors include Mr. Hugh C. Bischoff, Mr. H. E. Ibbs, Consultant Accountant to the Gas Light and Coke Company, Major General Guy P. Dawnay, and Mr. George Evetts and Mr. G. M. Gill.

S.B.G.I. Awards to Junior Associations

List of Recipients

The Council of the Society of British Gas Industries have again this year awarded Silver Medals to each of the Junior Gas Associations for the best Paper adjudged to have been presented during the session by their members at a meeting of the Association.

The interest aroused by these awards is best illustrated by the fact that this year twenty-three Papers from six Associations were submitted to the Society for adjudication.

Below is a list of the awards:

Manchester and District Junior Gas Association.

T. HIBBS . . . . . May 9, 1934

"The Design and Construction of Complete New Works at Mossley."

Wales and Monmouthshire Junior Gas Association.

F. ROBERTSON . . . . . Jan. 20, 1934

"Some practical observations on Installing Domestic Gas Water Heaters."

Western Junior Gas Association.

H. D. SULLIVAN . . . . . Dec. 1, 1934

"Economic Considerations of Gas-Fired Central Heating."

Midland Junior Gas Association.

F. H. BATE and A. R. MYHILL . . . . April 12, 1934

"Factors influencing Carbonizing Results in Vertical Retort Practice: Some Recent Experiments at Birmingham."

Yorkshire Junior Gas Association.

A. H. CLUCAS . . . . . Nov. 17, 1934

"Leakage in Horizontal Gas Retorts."

London and Southern District Junior Gas Association.

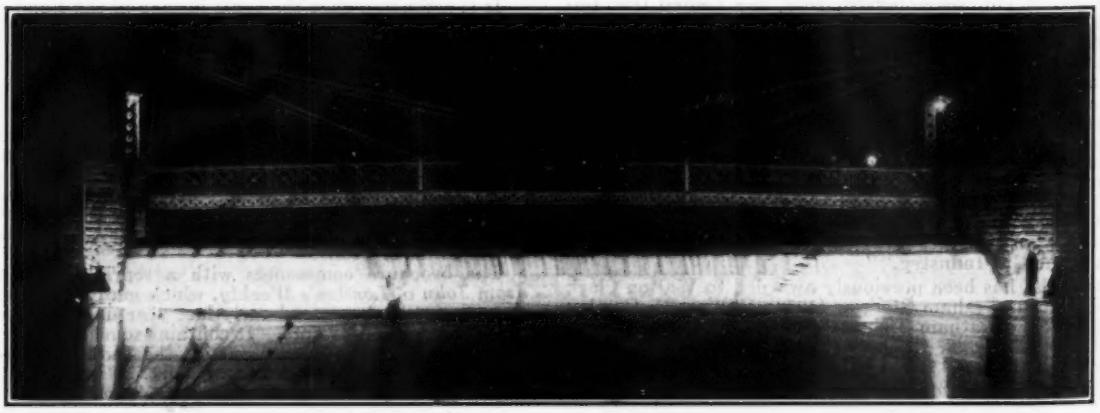
T. G. NOBLE . . . . . Nov. 23, 1934

"The Design of Gas-Fired Water Heaters, with special reference to heat transfer."

"Who Pays for the Leak?"

We apologize to Mr. H. E. Bennet for describing him in the introduction to his article last week, as Manchester Director of Messrs. Alder & Mackay, Ltd. He is, of course, so well known as Managing Director of the Firm that we feel sure the misstatement will have been generally recognized as a typographical error.

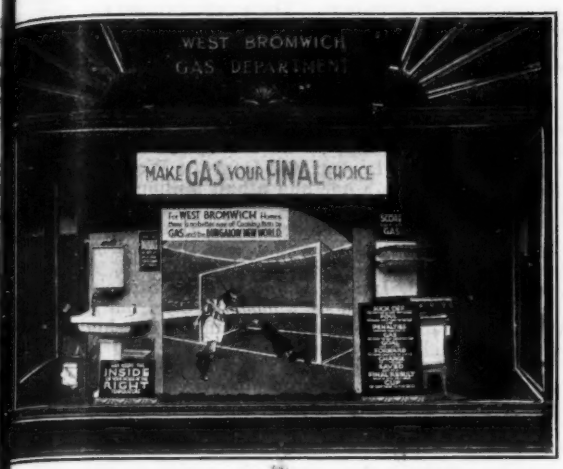
Effective Floodlighting of Waterfall at Leamington



[Photograph by "Leamington Spa Courier."

A novel and effective piece of floodlighting in connection with the Silver Jubilee Celebrations has been carried out by the Leamington Priors Gas Company. This, as our photograph shows, is of the Mill Bridge Waterfall, Leamington Spa, the lighting being done by four gas floodlamps—two at each end—supported on wooden staging just above water level suspended from the stone walls at the approach to the Bridge. Each lamp contains fourteen No. 2 mantles.

A Cup Final Window Display



This ingenious showroom window display was arranged by the West Bromwich Gas Department, and created a considerable amount of public attention at a time when local interest was centred around the prospects of the "Albion" team in the Cup Final.

Athletic and Social

Edinburgh Gas Department Golf.

The Edinburgh Gas Department Golf Club held their Spring competition at North Berwick on Saturday, when the prizewinners were: 1, T. E. MacDonald (1) 79; 2, Wm. Purves (15) 82; 3 (a tie), Geo. Moffat (16), J. A. Anderson (scr.) and F. Geddes (6) 83.

Manchester Gas Department.

The Manchester Gas Department (Sales Section) Dramatic Society played "Death Takes a Holiday" in the Lesser Free Trade Hall on April 25, 26, and 27.

Tunbridge Wells Co-Partnership.

The annual meeting of co-partners of the Tunbridge Wells Gas Company was held at the Byng Hall on April 11—Mr. Harold A. Beeching presiding, supported by Messrs. K. W. Hickman and S. W. W. Delves (Directors), Col. John Egginton, O.B.E., Messrs. L. J. Langford (General Manager), F. J. Brampton (Secretary), and F. G. Wicks (Assistant Secretary).

The Chairman said that they would have gathered from the reports of the Co-partnership and Pension Funds that they were in an excellent state. The Co-partnership Scheme had been in operation for about 27 years, and during that time had made remarkable progress, and continued to expand.

He was glad to say that the bonus of 5% on standard wages and salaries for the year was being maintained. The total number of co-partners now was 193, of whom 160 held stock in the Company to a nominal value of £5,245, the market value of which was about £8,000. It was interesting to note that voluntary savings had increased during the year. The benefits of such a scheme as theirs could not be too highly valued. Nearly 60 gas companies were now running similar schemes, the number of employees being nearly 50,000.

The Pension Fund, which was inaugurated ten years ago, would become operative on July 1 next, when it would be open to any man who had reached the age of 65 to go on the fund. The total of the fund was £31,657, of which £23,990 was invested in gilt-edged securities, leaving a balance of £7,666 on deposit with the Company. The Directors had arranged for a further actuarial report, which, he had not the slightest doubt, would disclose a very sound position. The original figure aimed at by the Directors was £30,000, and he thought they might congratulate themselves on the result.

The Chairman said he was pleased to announce as regards the Royal Jubilee celebrations and the declaration of Monday, May 6, as a Bank Holiday, that the Directors had decided that the day's wage should be paid for that holiday. Those employees who were required on duty would receive an extra day's pay, or the alternative of a day's holiday with pay at some future date to be mutually arranged.

At the conclusion of the meeting, Mr. Beeching, on behalf of the Committee of the Athletic Club, presented to Mr. C. J. Pilbeam, the Hon. Secretary of the Club, a fireside chair from the whole of the members in recognition of his services during a period of 10 years. He had worked extraordinarily hard, and he was sure few people realized the amount of work connected with a club of this kind.

Mr. Pilbeam suitably acknowledged the presentation.

The meeting was followed by supper kindly provided by the Directors.

A Hundred Years of Gas at Torquay

Centenary Commemorated

A visitor to the parish of Tormohun on the late afternoon of the eighth day of October in the year 1834, would have sensed that an event of extraordinary public interest was impending. In the shopping centre an air of tense expectancy was manifest: groups of excited residents were discussing with animation the thrilling prospect of the "Wickless lamp"—a lamp in which "inflammable air" was to illumine the shops of the traders. Some of the bolder and more impatient spirits, eager to test the possibilities of the new illuminant, applied their tapers to the jets before sunset, and many of the burners were lit before dusk had fallen. Gradually the Strand grew brilliant as shop after shop lit up.

The foregoing forms the introduction to an interesting brochure which has been published by the Torquay and Paignton Gas Company to commemorate the completion of a hundred years of service to the town.

The illumination of the shops was so eminently satisfactory that, in the autumn of 1834, meetings were held at Batt's Royal Hotel, and it was determined to apply to Parliament for "An Act for lighting, watching, and improving the parish of Tormohun, in the county of Devon." By this Act eighteen commissioners were elected with power to "light the streets with gas, oil, or otherwise." One of the first acts of the commissioners was to provide forty gas lamps in the principal thoroughfares which the Torquay Consumers' Gas Company undertook to supply during eight months in the year at a charge of three guineas per lamp. As the price of gas to private consumers at that period was 12s. 6d. per 1,000 cu.ft. the charge for street lighting does not appear to have been excessive. Notwithstanding the high price of gas (from modern standards) for many years the Company paid no dividends.

The First Gas-Works.

The first Works of the Company was erected at the head of what are now known as Torwood Gardens, but owing to the rapid growth of the town it was considered expedient to remove the Works to a site at Temperance Street.

The development of the town was such that by 1855 the productive capacity of the Works was inadequate, and in February a rival undertaking known as the Torquay, Tor, and St. Marychurch Gas Company was formed and the Royal Assent to their Bill was secured in the year 1855. The Company proposed to construct their Works on Oddicombe Beach, but having failed to comply with the provisions of their Act, they could proceed no further, and the old Company was left to supply the town. The site at Temperance Street was, however, so restricted that extensions were impossible, and another Company was formed to acquire the old Works and purchase land from the Ecclesiastical Commissioners on the border of the Parishes of Cockington and Paignton. Their Act received the Royal Assent in June, 1860, and on July 28 the foundation stone of the new Works at Hollacombe was laid, gas being supplied from these Works in March, 1861.

In September, 1860, St. Marychurch complained that the supply of gas was unsatisfactory, and it was contemplated to provide their own Works within the parish. The following February the Tormohun Local Board was asked to undertake the supply of gas to St. Marychurch. In 1869 the suggestion was made that they should buy out the Company on the ground that the public utilities should be under control of the governing body. No agreement was reached, however, and the St. Marychurch Local Board stepped in and bought the Company's mains in their district and erected Works of their own at Hele. In 1900 these passed into the possession of the Torquay Corporation, under whose control they were administered until 1926, when the gas undertaking was purchased by the Company.

At intervals between 1860 and the present day, under the provisons of various Acts and Orders, the Company have been able to develop their Works, extend their area of supply and increase the scope of their activities generally.

Of comparatively recent years the most important event was the amalgamation of the Torquay and Paignton Undertakings which took place in 1923, and subsequently the manufacturing plant at Paignton was closed down and the whole area supplied with gas from the Company's Works at Hollacombe.

The Gas-Works To-Day.

And so we pass from the fascinating realm of history to the more prosaic but still interesting subject of the Gas-Works as it stands to-day, and we give a brief description of the more prominent features of the existing plant.

The Hollacombe Works covers an area of twelve acres, adjoining the Great Western Railway, between Torquay and Paignton. Although situated close to the sea, it is impossible to discharge sea-borne coal direct into the Works. It is, therefore, unloaded at Kingswear, at the estuary of the River Dart, and transported thence by rail to the Company's sidings.

There are six settings of retorts, each capable of making half a million cu.ft. of gas a day, and each comprising eight retorts. Each retort carbonizes four tons of coal per day.

The crude gas, on leaving the retort house, enters the condensers, which comprise two towers of the water tube type of 3,000,000 cu.ft. daily capacity. Cooling is effected by means of water from the Company's own reservoir, and the heated water is run off into the boiler feed tank.

From the exhausters the gas passes directly into a Livesey washer and thence in series through two steam-driven rotary washer scrubbers. There are two sets of cast-iron purifier boxes. The purified gas then passes to the station meter, which is of the "Connersville" positive displacement type.

There are three holders at the Works for the storage of gas, one of 480,000 cu.ft. capacity and two of 200,000 cu.ft. capacity. There is, in addition, a water gasholder of 200,000 cu.ft. capacity.

On adjacent land, separated from the Works by the Torquay Road, stands a one and a half million cu.ft. capacity holder erected in 1930.

The area of supply comprises the Borough of Torquay, the Urban District of Paignton, and the Parishes of Collaton, Marldon, Stoke Gabriel, Kingskerswell, Abbotskerswell, Coffinswell, Ipplepen, and part of Stokeinteignhead. The district is supplied with gas entirely from Hollacombe Works, either by low-pressure mains or by high-pressure mains, through district governors.

The output of gas is in the neighbourhood of 675,000,000 cu.ft. per annum. The number of consumers grows steadily, the latest figures showing a total of about 17,000.

With a record of a hundred years of useful public service and a determination to maintain and enhance their tradition, the Company enter upon their second century with entire confidence in their ability to lighten the labours and increase the leisure and comfort of the community.

A Sports Pavilion Erected by Voluntary Effort

Last Saturday was a red-letter day in the annals of the Wandsworth and District Gas Company's Athletic Club, whose fine new sports pavilion, which has been designed and erected entirely by voluntary effort, was formally opened by Mrs. C. M. Croft, wife of the Chief Engineer and General Manager of the Company.

Progressive gas undertakings, who naturally have the welfare of their employees at heart, have always been in the forefront as regards the provision of athletic and social facilities for those who serve them. Particularly has such a policy been evident among those concerns who foster the true co-partnership spirit.

The achievement of the Wandsworth and District Gas Company's Athletic Club, however, stands somewhat apart in that they have provided themselves with a really magnificent sports pavilion entirely as a result of voluntary effort, both as regards design and construction—with the exception, of course, of a few specialized jobs.

The building, which has been erected by the labour of about a hundred helpers, was commenced in August, 1934, when the foundations were excavated for the cellars and boiler house. In its completed form the pavilion is imposing in appearance, being faced in pleasing red brick and fronted by a covered verandah 6 ft. wide, fitted with up-to-date lighting and approached by a broad semi-circular flight of red brick steps. The roof is covered with red tiles, while a gable over the entrance houses a clock with copper surround (which was beaten by one of the Club's members) and bearing the inscription "Wandgas A.C. 1934." The building is 84 ft. long by 42 ft. wide.

Folding doors give access from the verandah to the main club room, which occupies a large portion of the interior. This room is particularly commodious and is attractively finished with panelled walls and oak flooring. A large alcove at either end is lighted with a Sugg pendant, one of these alcoves being capable of use as a stage if required, while the other constitutes a very important part of the building—namely, the bar—behind which is the kitchen.

Lighting and Heating.

The illumination of the main portion of the club room is carried out by means of four ventilating ceiling lamps, each containing six burners, controlled by switches from the kitchen. These lamps were specially designed to harmonize with the style of the room and are very pleasing in effect. Two Ideal "Classic" gas radiators, one on each side of the entrance doors, and four further radiators round the walls serve to warm the apartment.

Sliding doors give access to a corridor at the rear of the club room, on the other side of which are the men's dressing rooms. There are three of these, all equipped with benches and clothes racks for the use of players. The walls here are plaster finished in white for the time being, though it is intended in due course to distemper them some suitable colour.

At the end of the corridor is the bathroom, which comprises a large room with concrete floor draining to a central outlet. The equipment here includes six wash basins with running hot and cold water, two shower baths, and a plunge bath 9 ft. long by 4 ft. 6 in. wide by 4 ft. deep sunk in the floor. A third shower is fixed over the centre of the plunge bath, and all three are fitted with mixing valves in order that any degree of water temperature may be obtained at will.

The ladies' dressing rooms are situated behind the kitchen and are entirely shut off from the remainder of the building. These comprise two dressing rooms with well equipped washing accommodation, each being provided with separate entrances from the verandah.

Steam pipes serve to heat the dressing rooms, while an impression of brightness and cleanliness is gained from the chromium plated fittings which abound. The corridors and dressing rooms are lighted by Sugg pendants, operated by switches, at night time, while a leaded window in the club room gives plenty of light during the day. Separate access is provided to the corridor, so that it is not necessary to pass through the club room in order to reach the dressing quarters.

Boiler Room.

The boiler room is situated below the pavilion and contains a "Britannia" coke boiler which supplies steam to the radiators, together with a battery of three Potterton gas-fired units with a 300-gallon lagged storage cylinder, for the provision of hot water for the lavatories. Adjacent to the boiler room is ample cellar space for stores.

The new pavilion serves a very fine sports ground extending to more than eleven acres and accommodating

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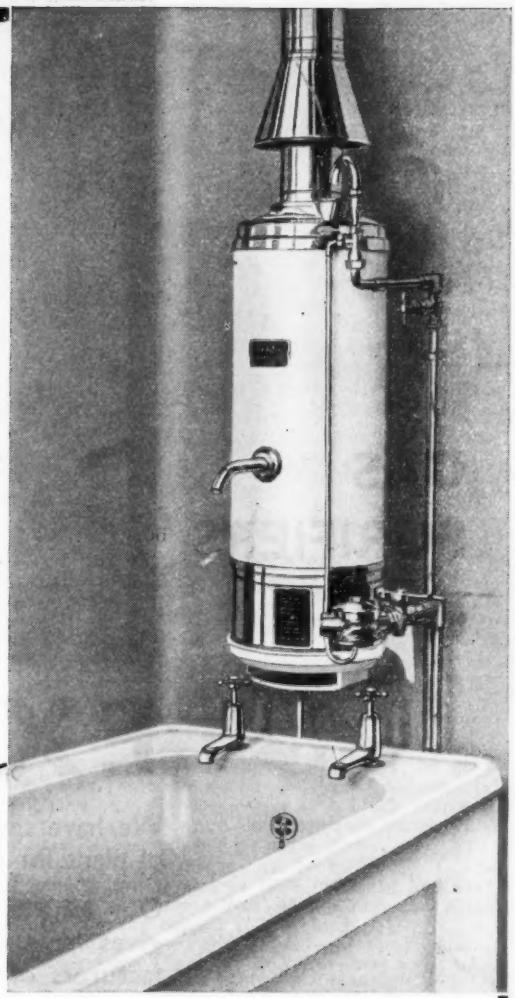
The G.L.C. Single Point Water Heater has been specially designed by The Gas Light & Coke Company for the supply of Hot Water to the bath or at any other point where an instantaneous and constant flow is necessary.



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The Heater is supplied complete with a fool-proof **Automatic Valve,** combined with a **Governor.** An improved pattern **Baffler** is included and the equipment is complete with a Porcelain-Enamelled **Wall Bracket** carrying a **Deposit Tray.**

The G.L.C. Heater is finished with a White Enamelled Exterior and Chromium Plated fittings. The exterior can also be supplied in Green or Blue Enamel.

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The G.L.C. Heater is manufactured under licence by R. & A. Main Ltd., who have made a special study of the production of modern gas water heating appliances.

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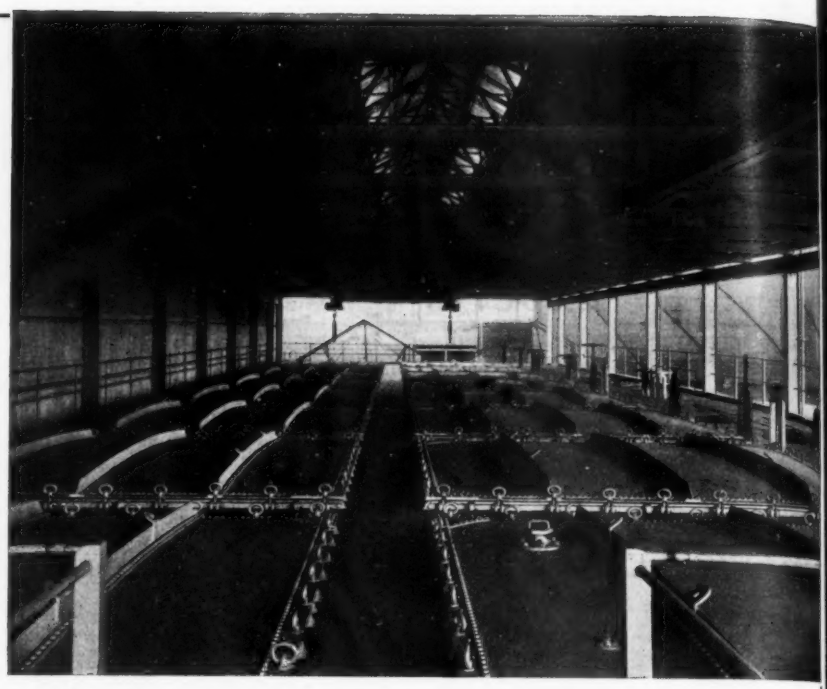

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cricket and football pitches, six hard tennis courts, a bowling green, net-ball ground, and miniature 9-hole golf course. During the summer months one of the chief features is the inter-departmental cricket tournament, for which no fewer than twenty-seven teams entered last year.

To mark the completion of this noteworthy effort, those who took part in the erection of the pavilion dined together in the club room on April 25, when they suitably celebrated the provision of this fine monument to the team spirit of the Wandgas Athletic Club.

The Opening Ceremony.

The new pavilion was formally declared open on Saturday by Mrs. C. M. Croft, wife of the Chief Engineer and General Manager of the Wandsworth and District Gas Company, who has always taken a keen interest in the affairs of the Athletic Club, and a large gathering of co-partners and their families assembled for the occasion. Mrs. Croft was welcomed by Mr. G. F. Page, J.P., a Director of the Wandsworth and District Gas Company, who referred to the splendid work which had been put in by the members in their spare time in the construction of this pavilion.

Mrs. Croft then severed the ribbon which stretched across the entrance and declared the building open, at the same time wishing the Wandgas Athletic Club all success in the future. She also thanked them very much for the invitation to open their new pavilion.

A vote of thanks to Mrs. Croft for performing the opening ceremony was voiced by Mr. A. E. Harrison, who, as one outside the Company, expressed his admiration of the wonderful spirit which prevailed in the Club and which had prompted the members to build this fine pavilion.

Mr. C. M. Croft finally recorded an expression of appreciation, on behalf of the Club, of the generous assistance given by a number of firms in the equipping of the new building, among them Messrs. William Sugg & Co., Ltd., for the provision of lighting fittings and switches.

A thorough inspection of the pavilion was then made by all those present. and admiration was expressed on every side at the excellent workmanship, lavish equipment, and general comfort provided in the building.

Heating by Radiators

The case for this method of space heating is discussed by the Parkinson Stove Company, Ltd., with special reference to a new type of appliance which they have recently introduced.

Effective room heating depends as much upon the distribution as on the amount of radiant heat. The conditions under which an appliance must operate have been carefully studied; the question of space, cost, the modern trend towards small bedrooms and kitchens have all to be taken into consideration when designing any particular appliance. The whole of the facts for any particular case must be considered carefully in developing an idea or designing an appliance to meet any particular want.

It is an obvious paradox that the object of room heating is to warm the occupant of the room rather than to heat the room itself, and when it is desired to use a room for a short period, or where it is desired to heat a limited space in a large room or shop, it is more economical to use a unit which heats a limited space effectively rather than one which disperses its heat output over the entire room.

The ordinary type of radiator has had a well deserved popularity for many years, and it has proved itself to be a thoroughly efficient means of heating halls and large rooms which are required for public meetings, and in which the heating is usually to be maintained for a considerable number of hours at a time. It is a not uncommon experience, however, that such rooms are frequently required at exceedingly short notice, and it is not possible by means of the normal methods of heating to obtain satisfactory warmth for perhaps a few people who are wishing to use a section of the room.

Heating by radiators gives uniform air temperature, and since room temperature is dependent mainly upon the circulation of hot air, warming of the walls and ceiling takes place directly by the warm air currents which rise from the radiator, and which are diffused round about the room. The standard radiator does actually emit some 40% of its total output as radiant heat, but as the radiator is almost invariably placed against a wall, at least half of this heat is intercepted by the wall and is not rendered available to the occupants of the room until it has been converted into convected heat by air currents passing over the heated surface of the wall. It may therefore be taken that the effective radiant efficiency of the ordinary radiator does not exceed 20% of the total heat input, and this being emitted by a relatively large area at low temperature is of low intensity and takes a long time before it becomes really perceptible.

Rooms which are subject to frequent air changes, such as shops, where constant opening of the door means frequent loss of heat and consequent influx of cold air, corridors, through which draughts are frequently more the rule than the exception, and rooms which are in constant use, are unsuited for heating by air circulation, since frequent changing of the air by draughts means that the actual heating medium is being constantly removed. In such circumstances it is evident that radiant heating is bound to be more satisfactory and effective.

Satisfactory comfort is obtainable even with low air temperatures when there is a source of radiant heat available, and the choice of a glowing source or a black source must depend to some extent upon the conditions under which it is to be used as well as upon personal preference. The gas fire working at temperatures up to 800°-900° C. emits radiant heat of comparatively high intensity and may be unsuitable for positions where people may be standing close up and thereby subject to scorching.

The Ubic radiator was first introduced to the public by the Parkinson Stove Company in September, 1934, when it was shown at the Building Trades Exhibition. It is a new departure and consists of a vertical reflector of approximately parabolic cross section with an oval tube fitted near the focus. The burners are placed in the base of the tube, which is heated internally and the heat is thrown directionally by means of the reflector. This construction has the advantage that the " speed of heating is increased as compared with standard patterns, and therefore the radiant heat emitted becomes apparent in a short time. By means of the incorporation of the reflector the heat which is normally thrown on the wall is now collected and concentrated into a beam which is thrown directly into the room.

The most noteworthy feature of this design is that the amount of radiant heat received directly in front of the Ubic radiator is ten times as much as that from an ordinary radiator with the same gas consumption. From this it must not be inferred that the total heat emitted is greater as this is not the case; but by collecting the radiant heat emitted, and concentrating it, it becomes possible to get effective room heating from a flueless radiator in the space of minutes.

Convection currents still play their useful part, and there is no overall loss of efficiency by reason of the altered construction, but by making the best use of the available radiant heat, it becomes the most prominent factor in the heating of a room. The consumption per unit is approximately 2,750 B.Th.U. per hour, and each unit throws a beam of heat directly in front with a maximum intensity of approximately ten times that emitted by a radiator of standard pattern with the same gas rate, while positions 30° either side of the front position receive half the maximum intensity. Each unit is capable of heating effectively some 80 sq. ft. of floor area.

Discoloration of walls and ceilings is to a large extent eliminated with the Ubic radiator, since the products of combustion are discharged from the front instead of the back.

The directional reflection of heat makes possible the use of smaller gas consumption than is normally considered desirable where the ordinary convection type of heater is employed, and the new radiator should therefore find considerable scope for use in offices, entrance halls, and shops.

ASPECTS OF THE Phenomenon of Combustion

by Dr. H. A. FELLS

In a Paper before the Yorkshire Junior Gas Association at a meeting at Bradford on April 13, Dr. H. A. Fells, B.Sc., A.I.C., A.M.I.Mech.E., discussed the diffusion flame system of combustion and reducing and oxidizing atmospheres.

Of recent years much attention has been given to what is popularly termed the " diffusion flame system." This is simply a new term for the oldest type of burning process. The flame of a match, a candle, and free burning gas are familiar examples of this type of combustion.

With the " diffusion flame system " as advocated to-day, use is made of luminosity and pre-heated air, and under certain conditions higher rates of heat transfer are obtainable with such diffusion flames than with maximum speed mixtures.

It has been claimed that the heat transfer per unit area with a luminous flame can be over four times greater than the heat transfer from a non-luminous flame, in open hearth steel melting, and also with the heating of steel bars for forging the rate of heating the charge can be increased by over 50%.

The technique of producing diffusion flames for the best results is very precise. The velocities of the air and gas streams just prior to ignition must be the same, and also the density of the air must be nearly that of the gas. Consequently, the air is preheated only to that point when the air density is the same as that of the gas, and the burner tubes need to be proportioned carefully so as to control the velocities of the air and gas. These matters influence the rates of diffusion of the air and gas and consequently the length of the flame and its temperature. The diffusion flame has an interesting application in the heating of steel billets for rolling. With the continuous type of furnace, it has been common practice to fire the furnace at one end with any burner system giving the highest flame temperature, such as high-pressure gas or air injection. The furnace is then very much hotter at the burner end, the products of combustion usually being very much hotter, and the furnace walls much hotter than the temperature required in the steel. Consequently, as this is the discharge end of the furnace, there is a danger of over-heating the steel, which is undesirable. Now with a diffusion flame furnace, the maximum temperature of the flame and walls of the furnace is less than with the ordinary type of furnace, and the difference between this and the desired temperature of the steel is also naturally less. But as we have greater radiation of heat from the luminous flame, the steel temperature can be raised to its proper point with less danger of overheating. Further features of the application of this type of flame will be mentioned in describing the products of combustion from a chemical aspect.

" Neutral " Waste Gases.

As has already been mentioned, it is only with gaseous fuel that very close approximation to " neutral " conditions in the waste products can be made. It is this fact principally which enables high thermal efficiencies to be obtained in practice, and such conditions should be sought whenever possible.

With atmospheric or natural draught burners it cannot be expected to obtain perfect combustion or " neutral " waste gases, but with those types of burner systems using high-pressure air injection or high-pressure gas injection, the full air quantity can be used as primary air, maximum rates of mixing obtained, and hence nearly perfect combustion from a chemical standpoint.

With atmospheric burners, the degree of primary air mixing has a very marked influence on the degree of combustion and length of flame, and hence on the amount of secondary air required to complete the combustion. It is not necessarily true that the best results in practice can be obtained with the highest primary air/gas ratio, and a fixed air/gas ratio set at the upper limit is not to be advocated, since the amount of secondary air depends not only on the primary air/gas ratio, but also on the conditions under which the flame is burning.

The temperature of the chamber round the flame, the amount of draught, the size of the burner ports, &c., control to a considerable extent the amount of secondary air drawn into an appliance, and so it is advisable to be able to alter the primary air/gas ratio by simple adjustment, as the factors controlling the secondary air quantity vary.

Another factor which may be mentioned is that the air/gas ratio with high gas pressures is remarkably constant. With venturi type mixers, the air/gas ratio remains nearly constant over a very wide range of gas pressures above a certain low minimum, but with straight sided burners, the air/gas ratio does not remain so constant with varying gas pressure.

With a suitably designed venturi type mixer, it has been shown that the air/gas ratio is constant with any gas pressure between ½ lb. and 4 lbs. per sq. in.

With low-pressure gas burners, such as atmospheric burners, variation in the gas pressure has a more marked effect on the degree of primary air injection, and it is more important to maintain a constant gas pressure.

The production of " neutral " waste gases by perfect combustion means that the total heat of the fuel, neglecting that lost by radiation, is present in the minimum quantity of waste gases. Any air in excess of that required for perfect combustion adds to the total volume of waste gases leaving an appliance, and carries away its own quantity of heat, depending on the temperature of the waste gases.

It is desirable that a more correct understanding be had of the meaning of " neutral " products of combustion. The commonly accepted meaning is perfect combustion with no excess air and no excess unburned gas. Such mixtures of carbon dioxide and water vapour are far from being chemically neutral and great care should be exercised in making claims for them in practice. They are " neutral " only from the standpoint of quality and degree of combustion, and exhibit differing degrees of chemical reaction when in contact with different types of material, principally metals and metallic oxides.

For instance, so called " neutral " products of combustion react chemically with steel at any temperature above a red heat, and the higher the temperature the greater the amount of chemical reaction. That is why steel, even at a low temperature, is scaled or surface damaged if " neutral " combustion is being used. Fortunately, the nature of gaseous fuel and the control possible with its combustion enable us to overcome this effect comparatively simply, as will be seen later.

" Reducing " Waste Gases.

When gas is burned to give " reducing " waste gases, unburned gas is present, which naturally results in a loss of potential heat. An analysis of such gases will indicate the presence of carbon monoxide, and a knowledge of the amount present, along with a knowledge of the composition of the fuel itself, can be used to show the actual percentage of potential heat loss.

Under such conditions the temperature of the flame is also reduced, but with flames having large excesses of unburned gas free carbon is also present due to the decomposition of the methane and other hydrocarbons. This increases the amount of radiation, and the heating value of the flame, in spite of its lower temperature, may even be increased.

Quite apart from considerations of actual temperature and heat transference, the use of gaseous fuel under conditions of incomplete combustion is generally acknowledged to be the best for most heat-treating operations in the steel industry, and, paradoxical as it may appear at first, the greatest economy is secured in steel heating furnaces when the gas in the working chamber is not completely burned. And this economy is not only a process economy, bearing on items such as prevention of scale or surface damaged metal, as the combustion is completed after the incompletely burned gases have left the actual working chamber.

The final combustion takes place in the recuperator re-

generators themselves, so that the heat in the waste gases, both sensible and potential heat, can be used to preheat the air for the first stage of combustion.

This method does not give the highest possible thermal efficiency, but the overall efficiency attained far outweighs any loss due to low thermal efficiency. The reasons for this are several. The combustion with insufficient air is slower, giving long slowly-moving flames, resulting in more even distribution of heat throughout the furnace chamber. Excess gas is present—carbon monoxide, hydrogen, and undecomposed hydrocarbons—which in sufficient quantity prevents the water vapour and carbon dioxide having any chemical action on the surface of the metal being heated.

With stainless steel sheets, and even ordinary mild steel sheets, this elimination of surface damage on the metal has a greater influence on the overall efficient use of gaseous fuel than savings in the total amount of gas used by attempting to obtain complete combustion in the working chamber.

The furnace efficiency, thermally, is, however, improved as much as possible by burning the unburned gas in the recuperator regenerators to preheat the air. In a similar manner, steel is reheated for drop-stamping in the same type of furnace, but the proportions of air and gas are such that combustion is completed in the working chamber in such a manner that long flames, partly luminous, result. In this case the type of heating is similar to that described in the case of the diffusion flame but with simpler burners.

The value of controlled combustion from a heating standpoint has already been described in the case of the diffusion flame, but in practice the influence of the " reducing " nature of the burning gases is also of great importance. In a simple case of combustion by diffusion the gas enters the furnace on the hearth level and the air at a higher point. A long flame results at the junction of these two streams, and is highly luminous. Consequently there is a belt of raw gas on the hearth of the furnace at the hottest end, gradually becoming diluted with products of combustion as it passes along the hearth.

The amount of unburned gas at any zone in the length of the furnace is controlled by the factors previously described, the temperature of the air, its velocity at the burner, and the gas and air ratio.

The unburned gas in this case, too, exerts a protective effect on the metal being heated and reduces the amount of scale—an important item in drop-stamping and rolling. Without proper furnace design and attention to operating items described, there is a danger of losing potential heat in the waste gases, but again the rapid heating and control of maximum temperature outweigh this loss of heat. One could give almost countless examples of the value of having excess gas in the products of combustion, but sufficient have been given to indicate that in many industrial processes the chemical effects of unburned gas can outweigh the loss of potential heat due to incomplete combustion.

" Oxidizing " Waste Gases.

Here, too, the amount of air in excess of the theoretical amount required for perfect combustion involves a loss of heat and a reduced thermal efficiency. As in the cases of excess gas, products of combustion containing excess air have important industrial applications. Typical examples of the use of excess air are core-baking, enamelling, " burning " of refractories, and even certain types and forms of steel.

Having drawn attention to the commonly accepted types of " atmosphere " produced by varying degrees of combustion, and shown how these are used to advantage in different trades, it may be of interest to give briefly the chemical significance of the different individual gases concerned with combustion.

It may be argued that specific details of the action and properties of individual gases present in a gaseous fuel and produced by its combustion are merely of theoretical interest, but careful study of this matter has not only thrown light on many features observed in practice, but has enabled greater practical use to be made of gaseous fuel.

Also such knowledge indicates very clearly possible lines of future development, and processes recently put into practice in this country and abroad are based directly on an understanding of the chemical properties of individual and mixed gases in products of combustion.

In many instances products of combustion of different degrees of completeness have been subjected to further treatment to remove certain constituents, or to alter their proportions, and then used for very particular processes by what is termed " atmosphere control." But for the purpose of this paper we will confine ourselves to mention certain properties of the commoner products of combustion —carbon dioxide, water vapour, carbon monoxide, hydrogen, and methane—with reference to their action on steels.

It is commonly known that air, or the oxygen in it, is responsible for the greatest chemical action on steel, oxidizing the iron in it to iron oxides or scale, and oxidizing the carbon in it to oxides of carbon. In steel heating furnaces, then, the amount of excess air should be kept as low as possible to prevent action of the oxygen on metal as well as to obtain high thermal efficiency. It is not so commonly known, apparently, that both carbon dioxide and water vapour are also capable of forming iron oxide and oxides of carbon when in contact with steel at high temperatures.

The formation of iron oxides is known as scaling, and the formation of oxides of carbon by action on the carbon in the steel results in lowering the carbon content of the steel at the surface and is known as decarburization. Although carbon dioxide and water vapour are not so active as oxygen in these respects their activity increases as the temperature rises, and the amount of reaction to steel naturally depends upon the relative proportions of the two gases. After oxygen, water vapour is the most serious offender, and even with so-called " neutral " products of combustion, with complete freedom from excess air, scaling and decarburization are produced. The other gases, hydrogen, carbon monoxide, and methane, do not form oxides on iron. Hydrogen, however, has a powerful action on the carbon in steel, especially if moisture is present, and so is a strong decarburizing agent.

It will be apparent then that if products of combustion can be made containing a proportion of hydrogen with the carbon dioxide and water vapour, the separate actions of these gases on iron and carbon in steel can be balanced. That is why excess gas is used in most steel treatment furnaces at the lower temperature at any rate. As the temperature used increases, the amount of hydrogen or excess gas required also increases, and great use has been made in the steel industry of the value of excess gas over and above that required for perfect combustion.

Carbon monoxide and methane have properties distinct from those of the gases already mentioned. They do not form oxides of iron on steel, and instead of removing carbon from the steel they actually add carbon in most circumstances. That is, they carburize the steel. In fact, carburizing of mild steel by purging with town gas has been turned to a very practical advantage and is being carried out in place of the old methods of packing the steel to be carburized in carbonaceous solid mixtures. The method used gives remarkably accurate control of the quality of the carburizing.

The possibility of carburizing mild steel when attempting to prevent scaling of the metal by purging with raw gas or with waste gases containing large excesses of unburned gas should be guarded against. The raw gas purge is only to be used when the steel already contains a high percentage of carbon, or when the time of heating is very short.

Without labouring the subject of the action on materials of gases concerned with combustion, it will be appreciated that the control possible with the combustion of town gas can give a great variety of gaseous mixtures each of which has its own specific practical value in metal treatment, in addition to the control of temperature and heat distribution.

The water vapour produced by combustion demands singular consideration for many reasons, one of the most important being the problem of condensation. Associated with condensation is the corrosion of the material on which the condensation takes place, corrosion being a chemical process similar to the scaling of iron at high temperatures previously mentioned.

Condensation of water vapour from waste flue gases is, from a technical viewpoint, a rather complex problem and in practice further complications arise which will be mentioned later.

The condensation point for steam under atmospheric pressure is 212° F. (100° C.), but in flue gases the water vapour (steam) is not at atmospheric pressure. The pressure of the water vapour in products of combustion is in proportion to the percentage by volume present, as, for example, if 20% by volume of the waste gases is water vapour, then the pressure of the water vapour present is 0·2 atmosphere. Most town gas supplies give a water vapour percentage of approximately 20% of the total waste gases, and reference to steam tables will show that the condensation point at this concentration is 142° F. (62° C.).

If a mixture of gases containing 20% water vapour is allowed to cool from a high temperature, say, 300° F. (149° C.), no water vapour will condense until the temperature has fallen to 142° F. (62° C.). At this point only a small fraction of the total water present will form liquid water, the rest remaining to saturate the mixture

at 142° F. (62° C.). As the temperature is lowered still further, the amount of water-vapour condensing as liquid increases, a certain amount always remaining to saturate the mixture at the lowest temperature reached. More simply stated, the lower the temperature of the gas mixture, the less water vapour can it hold, and any water vapour above this amount must condense as liquid water.

In practice it is not such a simple matter to determine the condensation temperature as the foregoing account would suggest. It has been customary to determine this point from direct calculations of dew-points or saturation tables, but investigation has shown that actually condensation begins at a higher temperature than that calculated.

Traces of the products of combustion of sulphur, especially the sulphur trioxide, increase the condensation point many degrees. The greater the amount of sulphur in the fuel being burned, the greater is the amount of the oxides of sulphur formed, and it is the solubility of the sulphur trioxide in the water formed which increases the temperature at which condensation will take place.

It will be appreciated then that the sulphur content of a fuel has a very important influence on the problem of condensation, especially when the waste gas temperature is low.

Apart from this chemical effect on the condensation point, condensation occurs even when the mean temperature of the flue products is considerably higher than the temperature at which condensation should take place. In the flue pipe there is a steep temperature gradient from the centre of the pipe to the outside. The temperature of the gases may be 250° F. (121° C.) at the centre and yet very much below the condensation temperature at the sides. Naturally water will deposit on the cool surfaces.

By adding further supplies of air to the waste gases the temperature at which condensation occurs can be reduced, simply by lowering the degree of water saturation, but, at the same time, the mean temperature of the mixed waste gases is also reduced.

Most domestic appliances such as water heaters are fitted with a back-draught diverter which also enables this extra amount of air to be added to the flue products, but any advantage from this is counterbalanced by the stratified flow in the flue with consequent cooling of the gases in contact with the side surfaces.

A consideration of the points mentioned on the physical causes of condensation will indicate that although addition of quantities of excess air at a point beyond the appliance itself will minimize the amount of condensation, and the suitable placing of baffles in the flue pipe may reduce the stratification and tend to keep up the temperature of the waste gases near the sides of the flue, it cannot be expected that condensation will be entirely prevented. There are many good practical methods of dealing with the water formed, in which the water falls into a drain and can be conducted away, but we are still left with the problem of corrosion in the flue. The acid condensate will attack iron rapidly, but has less action on certain other materials.

Cast iron and various forms of asbestos-containing materials have often been recommended, and have met with some degree of success, but it is suggested that other materials might be tried with advantage. It is quite likely that many of these materials to be suggested have already been tried in practice by certain undertakings, but any results obtained have not apparently been made common knowledge, or have been out-balanced on the count of initial cost. Methods which, it is suggested, might be tried, include the following:

1. Using a mild steel sheet flue, painted inside with a heavy coating of aluminium paint, or even metal sprayed.
2. For short flues, aluminium sheet itself.
3. Tinned iron sheet.
4. Mild steel sheet painted inside with acid and heat resisting paint, of which there are many kinds already on the market.
5. Mild steel sheet suitably japanned inside.
6. An acid resisting steel would no doubt be ideal, but its price at present would probably be prohibitive.

A period of use in practice of flue-pipes embodying the foregoing suggestions might assist in solving the problem of corrosion due to acid condensation, since formation obtained has shown that the materials suggested are very little acted upon by products of combustion. Further useful information might be gathered by using these materials under working conditions, on the different surface tension effects, which will influence the formation of surface films of water. If the water can be caused to retain a spherical form, it will have a less wetting effect on the sides of the flue.

Discussion

The PRESIDENT (Mr. Ralph Halkett, Junr.) said that Dr. Fells had only dealt with purified gas, whereas his Company supplied to industrial customers in a number of cases crude gas. He had been very much interested in Dr. Fells' description of the diffusion flame system, the name of which, he thought, came from America, and it showed them how an ambiguous term might turn out to relate to something that was perfectly simple and which they had all known before. Dr. Fells had mentioned the carburization of steel. He might have mentioned that even with an electric furnace, if they wanted such a temperature as that, they would have to use town gas to get it. With regard to the condensation in flue pipes, that was a point that they came up against constantly, both industrially and otherwise. Dr. Fells had set out several types of flue pipes which might be used, but in the majority of these cases there was some drawback to take into account. Chiefly it was a matter of price. The author a year or two ago did some important work in regard to condensation from town gas, and his figures made it clear that the matter demanded their attention.

Mr. J. W. WOOD said that in connection with corrosion The Institution of Gas Engineers had been carrying out important experiments for a couple of years. When he started the work as a research man with some experience, his first need was to find out what other people were doing and he went to his friends of the Metallurgical Institute and found that they had been studying corrosion for twenty years. So they would realize that if anybody expected him to achieve results in a year or two they were doomed to disappointment. There was a vast amount of information relative to the corrosion of metals in a book which was practically a bibliography of about 7,000 Papers on corrosion which had been published in recent years. A fundamental point of the inquiry was that corrosion did not depend wholly on the materials that were used but was equally dependent on the conditions of the use of the materials. Therefore, to speak of the materials without specifying the conditions of the use of them was quite wrong. So they ought to carry out corrosion experiments under conditions which would be applicable to the Gas Industry, and such information took a good deal of time to collect. The experimental difficulties were considerable. A great deal seemed to depend upon the conditions in the flue pipe itself. It was highly probable that not more than 20 to 25% of the acids in the gas were in the form that had been referred to by Dr. Fells, and in the case of a number of materials it was found that the sulphur could be removed quantitatively. Experiments had been made with gas containing 25 grs. of sulphur, and 50 grs., and there were more experiments in progress with 10 grs., and later they would come down to 5 grs. or as low as they possibly could, to see whether corrosion and sulphur could be eliminated. For this purpose they had to deal with metals offering very considerable resistance to corrosion. The chief of these seemed to be lead, solder, and tin. At the other end of the scale were zinc, iron, and galvanized iron, any of which seemed to combine quantitatively with the sulphur and go like the snow in spring. As to the other materials, copper, brass, bronze, and so on came intermediately. Aluminium was quite low down in the list among the moderately resisting materials. It was quite definitely better than iron or copper, but they would not get any permanent protection from aluminium itself. Hæmatite stood pretty well, but it was apt to disintegrate.

Mr. J. W. BARKER said that somewhere about 1900 R. H. Smith pointed out that in the case of a number of locomotive boilers not less than a quarter of the heat imparted to the boiler was imparted by radiation from the fuel bed in the fuel box. Dr. Fells had placed some importance on radiation. He would like to know whether Dr. Fells regarded transfer by radiation as the main means of heat transfer or whether conduction still played a very important part.

Dr. FELLS said he was grateful to Mr. Wood for his contribution to the discussion. The latter part of his own Paper on condensation and corrosion was intended more by way of eliciting information than giving it, and Mr. Wood had been very kind in putting that forward. As to the problem of heat transference by conduction and convection, without any doubt whatever the radiated heat alone was not the most important means of transference of heat from gases of material which was being heated, but as the Paper was definitely upon combustion he had tried to deal with these gases apart from convection and conduction. Gas carburizing, which had been referred to, was done more in the States than in this country. In the United States there were very special methods devised, a special process which was known as the intermittent surge method which seemed to give astonishingly good results. It was a method which, in his opinion, might with advantage be used in this country. It made a certain depth of case more rapidly than the carbonaceous material did.

Mr. R. N. WEBB (Leeds), in moving a vote of thanks, asked whether Dr. Fells preferred the producer gas for heating settings to contain considerable quantities of hydrogen or the lowest quantities. A certain undertaking had always practised making the largest quantity of carbon monoxide in the gas that they possibly could, the idea being to get length of flame rather than a short hot one.

Mr. J. W. CARLTON (Dewsbury) seconded the vote.

Dr. FELLS, in acknowledgment, remarked that, as to the heating of retort settings by producer gas, he thought that the less hydrogen there was in the gas the better. The matter of radiation of heat came in the same way that it did in steel heating. He would not, however, commit himself to a definite answer to that question immediately.

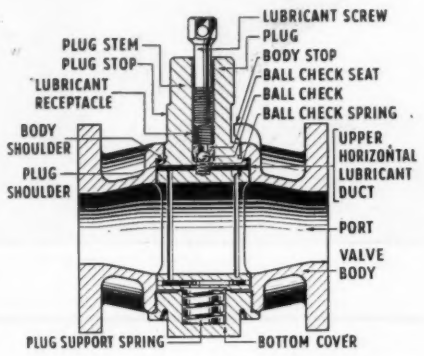
The Newman Milliken Valve

An extremely simple lubricated plug valve is being manufactured by Messrs. Newman, Hender, & Co., Ltd., Woodchester, Glos., who have appointed Messrs. Bell's Asbestos and Engineering Supplies, Ltd., as their stockists and service agents for this product in the British Isles.

After an experience of five years' successful service abroad in handling petroleum products, oils, water, steam, air, vacuum, gas, chemicals, &c., the valve, the makers claim, has the following advantages:

(1) It has a solid head construction and, therefore, glands, stuffing boxes, gaskets, &c., are eliminated.
(2) Its only moving part is always lubricated and, therefore, cannot rust or stick.
(3) It has a cylindrical plug in place of the more usual taper plug which, therefore, has not to be raised from its seat to be rotated.
(4) It shows positive indication when fully lubricated.
(5) All parts are interchangeable.
(6) Minimum head room required.

A sectional drawing of the valve is shown, and it will be seen that the lubricant, which is of a semi-solid nature in stick form, is introduced into the stem of the plug, and by means of the lubricant screw is forced past the ball check



along the upper horizontal lubricant duct and down the vertical lubricant ducts, where, by the operation of the valve itself, a film of lubricant is introduced between the plug and the body, effectively sealing it against both port and head leaks. It also prevents foreign matter getting in between the plug and the body. This, together with the fact that the plug is a very close fit in the body, prevents any scoring.

As the valve opens and closes with a quarter turn against a positive stop, only two of the vertical lubricant ducts pass the port opening in the body. These two ducts are fed with lubricant through the medium of short interconnecting grooves in the body which are so positioned that they only feed the ducts when the valve is in the fully open or closed position, thus preventing the lubricant being forced into the pipe line when the valve is being lubricated.

Further to safeguard an excess of lubricant getting into the pipe line, the pressure built up in the head of the valve when the lubricant screw is turned after all the ducts are full forces the plug away from the shoulder of the body against the resistance of the plug support spring and so allows the lubricant to escape out of the head of the valve, giving, at the same time, a positive indication that the valve is fully lubricated.

Roughly speaking, the lubricant screw should be given two turns every 250 operations of the valve, but this naturally varies considerably with different services and pressures.

To guard against the slightest risk of the valve leaking at the head, great care is taken during manufacture to lap the plug shoulder to the body shoulder, and as the plug support spring keeps these two surfaces under constant pressure contact none of the product can escape, even if the valve is unlubricated.

The valve is made in a variety of straight-through and threeway types, and from numerous metals and alloys to suits different services up to 3,000 lbs. to the sq. in. working pressure, and gear operation and indicators can be supplied when accurate control is necessary. A full range of lubricants is available for products up to a temperature limit of 500° F.

Full technical details and advice can be obtained from Messrs. Bell's Asbestos and Engineering Supplies, Ltd., at 157, Queen Victoria Street, or from their Slough Works or any branch office.

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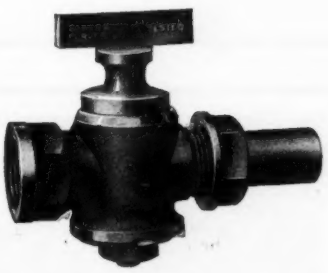

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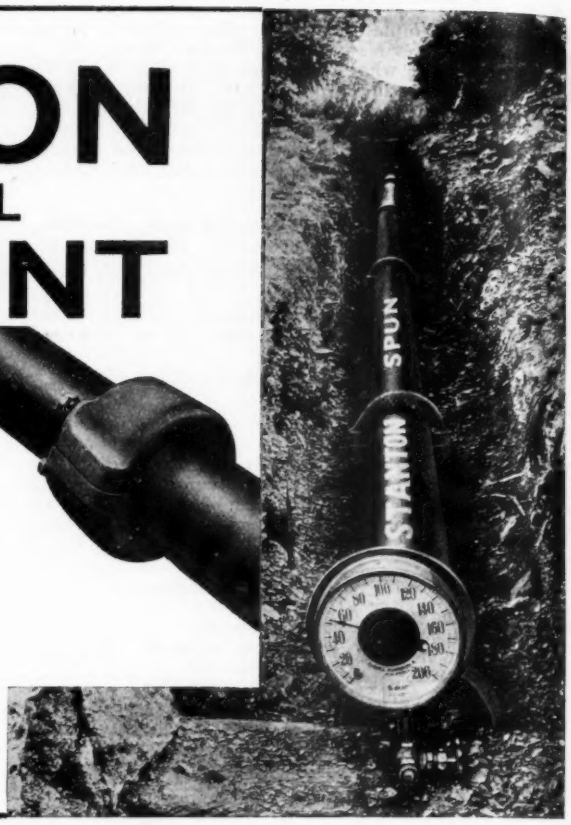


A simple adjustment of a lead ring, followed by an easy tightening of cast-iron setscrews, are the only operations necessary to assemble the Stanton Mechanical Lead Joint for spun iron pipes.

This leaktight metal-to-metal joint can be made in one minute by unskilled labour. It will hold high air and water pressures, and permits "draw" of the spigot and angular distortion. The lead joint-ring is mechanically held in place, and cannot be dislodged like ordinary caulking material. As there is no molten lead used the joint can easily be made in water-logged trenches.

THE STANTON IRONWORKS COMPANY LIMITED, Near NOTTINGHAM

SIX PURIFIERS, EACH 50 FT. × 30 FT. × 8 FT., ERECTED AT STOKE-ON-TRENT.

COMPLETE PURIFIER INSTALLATIONS.

C. & W. WALKER, LTD. DONNINGTON, NR. WELLINGTON—SHROPS.

LONDON OFFICE: 70, VICTORIA STREET, WESTMINSTER, S.W. 1.

Gas Markets and Manufactures

Stock Market Report

(For Stock and Share List, see later page)

As was anticipated, the Stock Exchange opened after the holidays with a strong tone, and though at the outset business was not particularly active the turnover increased as the week progressed. British Funds and other gilt-edged securities were in good demand and prices made headway, thus enhancing the prospects of further conversion operations. British industrials were also active, and the good reports of several leading concerns published during the week had a marked effect on prices in this section. Friday saw the close of a three weeks' Account with a spirit of optimism pervading practically all markets, and the outlook for the current week looks good.

The Gas Market had its fair share of business for a short session, and prices are slowly but surely recovering from the set-back of a few weeks ago. Nearly all the recorded transactions were put through at higher prices than a week ago, and this brought about several increases in quotations. Imperial Continental stock continued to improve, the quotation being marked up 3 to 215, and Wandsworth ordinary showed a similar gain at 157½. British ordinary hardened 2 to 157, while several other stocks went up 1 point. On the local Exchange Newcastle units gained a further 3d. to 25s. 3d. Other than an ex div. reduction, the only fall occurred in Commercial ordinary down 2 to 113½, at which price the yield, based on last year's dividend of 5¼%, works out at £4 16s. 11d.%

The accounts of the Bombay Gas Company, Ltd., show a satisfactory year's working. The sales of gas increased by 2·9%, and the gross profit from £21,253 to £24,736. The dividend for the year is maintained at 8%, and, after providing for this and transfers to reserves and allowing for profit on exchange, the carry-forward is increased from £39,000 to £42,158. The £1 shares are obtainable at round about 28s. to yield £3 14s. 3d.%.

Gas Consolidation, Ltd., the holding company formed in June last, is making an issue this week of 250,000 4% redeemable cumulative preference shares of £1 each at par, and 50,000 ordinary shares of £1 each at 22s. per share. The Company already has a substantial holding in the Severn Valley Gas Corporation and controlling interests in several other gas companies, and the proceeds of the present issue will be utilized for further similar investments. It is estimated that after providing for the preference dividend the balance available is equal to 5·39% on the ordinary shares.

Current Sales of Gas Products

The London Market for Tar Products.

April 29.

The position of the Tar Products market is as follows:

Pitch, about 40s. per ton f.o.b.

Creosote, 5½d.

Refined tar, 4d. per gallon in bulk at makers' works.

Pure toluole, 2s. 1d. to 2s. 3d.

Pure benzole, 1s. 7d. to 1s. 8d.; 95/160 solvent naphtha, 1s. 5d.; and 90/160 pyridine, about 5s. 9d.—all per gallon naked at makers' works.

Tar Products in the Provinces.

April 29.

The average prices of gas-works products during the week were: Gas-works tar, 20s. to 25s. Pitch—East Coast, 38s. to 40s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 38s. to 40s.* Toluole, naked, North, 1s. 8d. to 1s. 9d. Coal-tar crude naphtha, in bulk, North, 6¼d. to 6¾d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 4¾d. Heavy naphtha, North, 9¾d. to 10¾d. Creosote, *ex* works, in bulk. North, liquid and salty, 4½d. to 4¾d.; low gravity, 4⅝d. to 4¾d.; Scotland, 4⅝d. to 4¾d. Heavy oils, in bulk, North, 4d. to 4¼d. Carbolic acid, 60's, 1s. to 2s. 1d. Naphthalene, £10 to £11. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. to 3d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading rates and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *April* 27.

While quotations are fairly steady the volume of new business is disappointing.

Crude gas-works tar.—The actual value is now 28s. to 30s. per ton *ex* works in bulk.

Pitch.—Export season finishes with value purely nominal at 40s. to 42s. per ton f.o.b. Glasgow. In the home market round 40s. per ton *ex* works in bulk is quoted and accepted.

Refined tar is offered freely at 3d. per gallon naked at makers' works.

Creosote oil.—Prompt supplies are scarce and quotations for all grades remain firm. B.E.S.A. Specification, 5d. to 5¼d. per gallon; low gravity, 5d. to 5½d. per gallon; and neutral oil, 5d. to 5¼d. per gallon; all f.o.r. in bulk.

Cresylic acid.—This product is more active, but supplies still exceed demand. To-day's values are lower. Pale, 97/99%, 1s. 2d. to 1s. 3d. per gallon; dark, 97/99%, 1s. to 1s. 1d. per gallon; pale, 99/100%, 1s. 3d. to 1s. 4d. per gallon; all *ex* works.

Crude naphtha is commanding 4¼d. to 4¾d. per gallon, according to quality and district.

Solvent naphtha.—90/160 grade is 1s. 3d. to 1s. 3½d. per gallon, and 90/190 heavy naphtha is 10d. to 11d. per gallon.

Motor benzole is uninteresting at 1s. 2d. to 1s. 3d. per gallon in bulk *ex* works.

Pyridines.—90/160 grade is 5s. 6d. to 6s. per gallon, and 90/140 grade 6s. to 6s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole . . .	0 8½	to	0 9	per gallon at works
Motor ,, . . .	1 2	,,	1 2½	,, ,, ,,
90% ,, . . .	1 3	,,	1 3½	,, ,, ,,
Pure ,, . . .	1 6½	,,	1 7	,, ,, ,,

Contracts Advertised To-Day

Coal.

Conway Borough Council. [p. 283.]
Morecambe and Heysham Gas Department. [p. 283.]
Wallasey Gas Department. [p. 283.]

Water Softener.

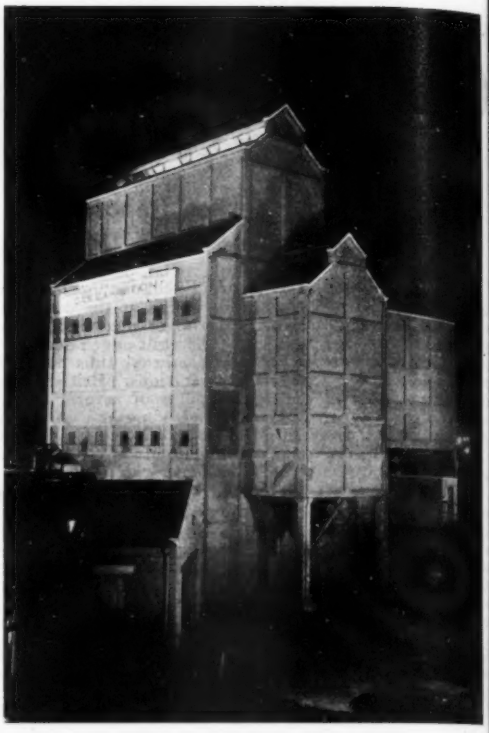
Wallasey Gas Department. [p. 283.]

Gas Undertakings' Results for 1934

Haywards Heath.

The annual report of the Haywards Heath District Gas Company, which was presented at the General Meeting of the Company, showed that the balance to the credit of the profit and loss account is £6,456, which it is proposed to deal with as follows: Final dividend at the rate of 10% per annum on the 5% consolidated stock for the half-year to Dec. 31, 1934, making 9% (less income-tax) for the year, £1,833; balance to be carried forward, £4,623; making a total of £6,456. The sales of gas show an increase of 2·6% for the year as compared with 1933. An issue of £10,000 4½% irredeemable preference stock was made in June at £109 2s. 6d.%. An order has recently been placed for the erection of an improved type of carbonizing and coal handling plant at the works. The Chairman (Mr. E. C. Charleton), in moving the adoption of the report and accounts, said that it was probable that a further issue of capital will have to be made in view of the extensions to the works. The total quantity of gas sold was 130,000,000 cu.ft. as against 127,000,000 cu.ft., an increase of 3,000,000 cu.ft., as compared with a decrease of just upon 2,000,000 cu.ft. in the previous year. The street lamps in the district have been considerably improved, especially at Cuckfield. The showroom sales show a satisfactory increase, the number of new appliances sold during 1934 being 420 as against 374 in 1933. The Company have also secured 187 new customers. During the year nearly £9,000 has been spent on improvements to the works and on the purchase of a property, where, in the near future, it is hoped to establish a more effective showroom than is at present in existence.

GLOVER-WEST
VERTICAL RETORTS TO-DAY



At the present time the total of installations of Glover-West vertical retorts erected by this Company in Great Britain and Ireland stands at 246, and the total nominal daily gasmaking capacity of these reaches 342 million cubic feet. In the British Dominions 42 plants have been installed, their total nominal daily capacity being 69¼ million cubic feet. In European countries there are 46 plants with a total nominal daily capacity of 62¼ million cubic feet, and in other parts of the world, 30 plants with a total nominal daily capacity of 50 million cubic feet. The total of plants in service or in hand throughout the world is 375, and the corresponding total nominal daily gasmaking capacity 535 million cubic feet.

Orders for installations of Glover-West vertical retorts have been received during the present year from the gas undertakings of Kilsyth and Montrose in Scotland, Buxton, Slough, and Svendburg (Denmark). Plants at East Hull, Yeadon, and Bilston are amongst those recently put into service.

WEST'S GAS IMPROVEMENT CO., LTD.

MILES PLATTING, MANCHESTER, 10. Telephone: Collyhurst 2061. Telegrams: "Stoker, Manchester."

LONDON: Regent House, Kingsway, W.C. 2. *Telephone*: HOLBORN 4108.

Glover-West Vertical Retorts.

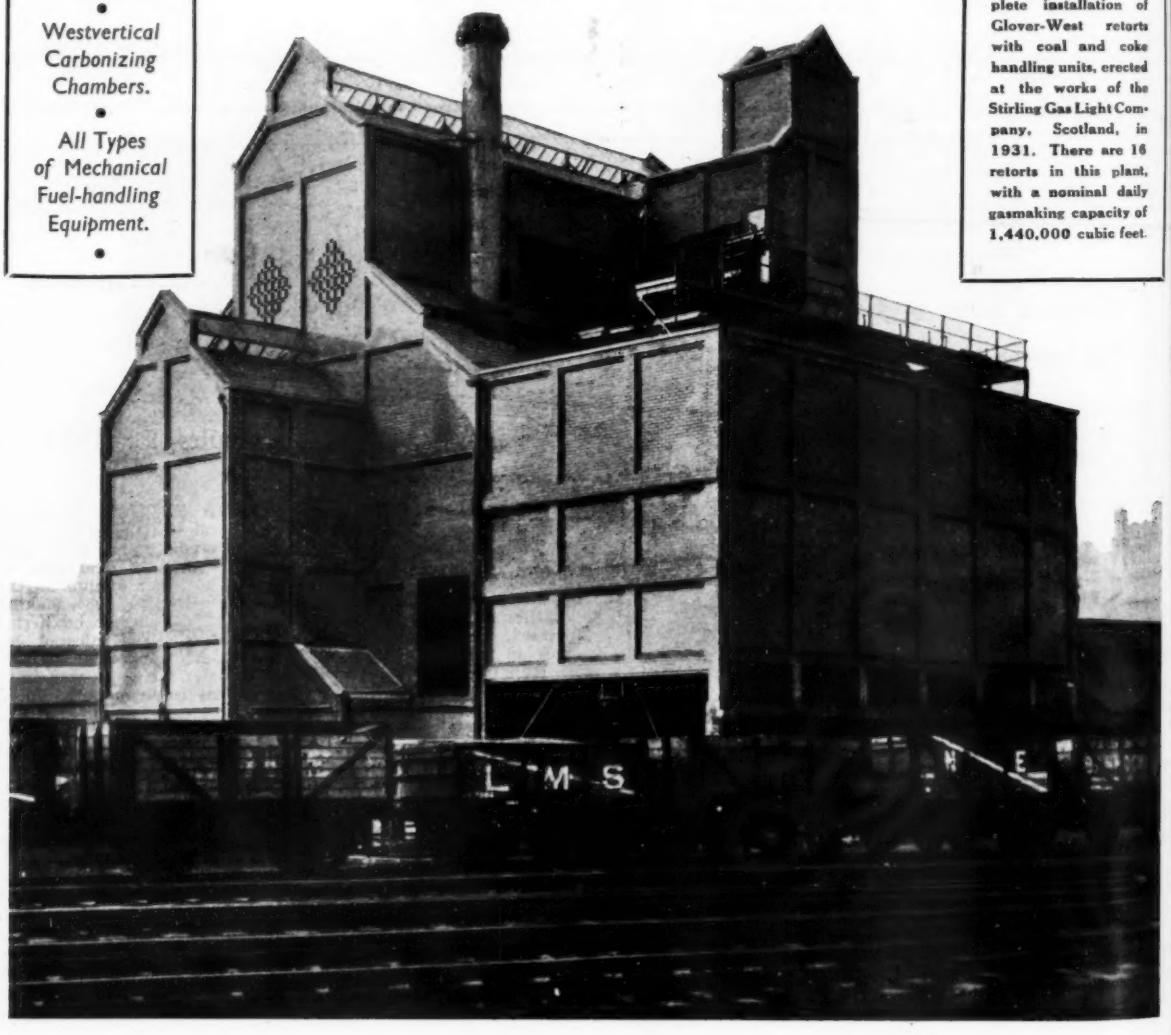
•

Westvertical Carbonizing Chambers.

•

All Types of Mechanical Fuel-handling Equipment.

•



Above and below are two views of the complete installation of Glover-West retorts with coal and coke handling units, erected at the works of the Stirling Gas Light Company, Scotland, in 1931. There are 16 retorts in this plant, with a nominal daily gasmaking capacity of 1,440,000 cubic feet.

STOCK AND SHARE LIST

Official Quotations on the London and Provincial Stock Exchanges

Issue. £	Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, April 26.	Rise or Fall on Week.	Transactions, Lowest and Highest Prices During the Week.
1,351,868	Stk.	Mar. 11	7	7	Alliance & Dublin Ord. ...	125—135	...	...
374,000	,,	Dec. 17	4	4	Do. 4 p.c. Deb. ...	90—100	...	...
557,655	,,	Feb. 18	7	7	Barnet Ord. 7 p.c.	165—170	...	...
300,000	1	Apl. 8	1/4⅛	1/9⅛	Bombay, Ltd.	28/—30/-*	- -/6	28/-
178,490	Stk.	Feb. 18	9½	9½	Bournemouth sliding scale ...	220—230	...	...
550,050	,,	,,	7	7	Do. 7 p.c. max. ...	167—172	...	168—171¾
439,160	,,	,,	6	6	Do. 6 p.c. Pref. ...	147—152	...	...
50,000	,,	Dec. 17	3	3	Do. 3 p.c. Deb. ...	86—91	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	104—109	...	...
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	125—130	...	...
357,900	,,	Feb. 18	7½	7½	Brighton, &c., 6 p.c. Con. ...	170—175	...	...
649,955	,,	,,	6½	6½	Do. 5 p.c. Con. ...	153—158	...	...
205,500	,,	,,	6	6	Do. 6 p.c. B. Pref.	145—150	...	148
1,487,500	,,	Feb. 4	5	5	Bristol, 5 p.c. max.	118—120*a*	...	...
120,420	,,	Dec. 17	4	4	Do. 1st 4 p.c. Deb. ...	102—104*a*	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	102—104*a*	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	122—124*a*	...	...
855,000	,,	Mar. 11	7	8	British Ord.	152—162	+2	155—159
180,000	,,	Dec. 17	7	7	Do. 7 p.c. Pref.	160—165	...	...
350,000	,,	,,	5	5½	Do. 5½ p.c. "B" Cum. Pref.	114—119	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—102	..	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	111—116	...	116
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	...
100,000	10	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1—3	...	...
150,000	Stk.	Dec. 17	4½	4½	Do. 4½ p.c. Deb. ...	88—93	...	...
626,860	,,	Jan. 21	6	6	Cardiff Con. Ord.	130—135	...	...
237,860	,,	Dec. 17	5	5	Do. 5 p.c. Red. Deb.	105—110	...	...
157,150	,,	Feb. 4	5	6½	Chester 5 p.c. Ord.	111—116*b*	...	...
98,936	1	Mar. 25	2/-	2/-	Colombo, Ltd., Ord.	1⅞—1⅞	...	...
24,500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	20/6—22/6	...	...
609,204	1	Mar. 25	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	20/—22/-	...	...
296,053	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	24/6—26 6	...	...
1,775,005	Stk	Feb. 4	5	6	Commercial Ord.	111—116	−2	113
475,000	,,	Dec. 3	3	3	Do. 3 p.c. Deb. ...	85—90	...	85
286,344	,,	Feb. 18	5	5	Do. 5 p.c. Deb. ...	123—128	...	...
807,560	,,	Feb. 18	7	7	Croydon sliding scale... ...	155—160	...	157
569,590	,,	,,	5	5	Do. max. div.	112—117	...	...
620,385	,,	Dec. 17	5	5	Do. 5 p.c. Deb.	125—130	...	126—127
542,270	,,	Feb. 18	7	10	Derby Con.	185—195*c*	...	...
55,000	,,	Dec. 17	4	4	Do. 4 p.c. Deb.	100—105*c*	...	...
239,000	,,	Feb. 4	5	5	East Hull Ord. 5 p.c.	111—116	...	...
181,625	,,	Feb. 4	6	6	East Surrey Ord 5 p.c. ...	131—136	...	...
175,609	,,	Dec. 17	5	5	Do. 5 p.c. Deb. ...	120—125	...	123
1,002,180	,,	Mar. 11	†	†7	European, Ltd.	110—115	...	110—110½
19,313,481	,,	Feb. 4	5½	5½	Gas Light & Coke 4 p.c. Ord.	27/—28/-*f*	...	27/6—28/-
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	85—90	...	86½—87½
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	104—109	...	105½—107½
6,102,497	,,	Dec. 3	3	3	Do. 3 p.c. Con. Deb. ...	88—93	+1	90—91½
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	115—120	...	116—117
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	111—116	...	115
270,466	,,	Feb. 18	6	6	Harrogate New Cons. ...	135—140	...	...
140,000	1	Mar. 25	1/7½	1/7½	Hongkong & China, Ltd. ...	1½—1½	...	...
213,200	Stk.	Feb. 18	6	6	Hornsey Con. 3½ p.c.... ...	128—138	...	...
5,600,000	,,	Oct. 22	14	10	Imperial Continental Cap. ...	210—220	+3	214—219
223,130	,,	Jan. 21	3½	3½	Do. 3½ p.c. Red. Debs.	91—96	...	...
285,242	,,	Feb. 18	8½	8½	Lea Bridge 5 p.c. Ord. ...	172—182	...	...
2,167,410	,,	Feb. 18	6	6	Liverpool 5 p.c. Ord.... ...	134—138*b*	...	...
245,500	,,	Dec. 17	5	5	Do. 5 p.c. Red. Pref. ...	105—110*b*	...	...
306,083	,,	Jan. 16	4	4	Do. 4 p.c. Deb.	104—107*b*	...	...
165,736	,,	Feb. 18	8	10	Maidstone 5 p.c. Cap. ...	185—195	...	...
63,480	,,	Dec. 17	3	3	Do. 3 p.c. Deb. ...	87—88	...	...
75,000	,,	Dec. 3	†10	†10	Malta & Mediterranean ...	205—215	...	214—215
392,000	—	Apl. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	100—105	...	...
231,978	Stk.	Feb. 4	5	5	M. S. Utility "C" Cons. ...	110—115	...	...
818,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	102—107	...	104
360,075	,,	Dec. 17	4	4	Do. 4 p.c. Deb. ...	103—108	...	...
148,955	,,	,,	5	†5	Do. 5 p.c. Deb. ...	125—130	...	...
125,000	—	Jan. 2	11/8	3⅛	Do. 3⅛ p.c. Rd. Rg. Bds.	98—101	...	...
675,000	,,	May 28	†6	††3	Montevideo, Ltd.	50—60	...	...
2,061,315	,,	Feb. 18	5	5½	Newcastle & Gateshead Con.	25/—25/6*df*	+-/3	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	106—107*d*	...	...
776,706	,,	Dec. 17	3½	3½	Do. 3½ p.c. Deb. ...	101½—102½*d*	...	...
277,285	,,	Oct. 8	5	5	Do. 5 p.c. Deb. '43 ...	105—107*d*	...	...
274,000	,,	Feb. 4	5	5	Newport (Mon.) 5 p.c. max....	108—110*a*	...	...
225,000	,,	Feb. 18	7½	7½	North Middlesex 6 p.c. Con.	170—175	...	...
396,160	,,	Feb. 4	5	5	Northampton 5 p.c. max. ...	105—110	...	...
300,000	,,	Nov. 5	†7	†9	Oriental, Ltd.	170—175	...	...
416,617	,,	Dec. 17	8	8	Plym'th & Stonehouse 5 p.c.	167—172	...	...
504,416	,,	Feb. 4	8	8½	Portsm'th Con. Stk. 4 p.c. Std.	173—178	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	110—115	...	...
114,000	,,	Jan. 21	5	5	Preston 5 p.c. Pref.	108—113	...	...
1,736,968	Stk.	Feb. 18	6	6	Sheffield Cons.	142—144*e*	+1	...
95,000	,,	Jan. 7	4	4	Do. 4 p.c. Deb.	103—106*e*	...	...
133,201	,,	Feb. 18	8½	5	Shrewsbury 5 p.c. Ord. ...	142—147	...	...
90,000	10	May 28	†4	††3	South African	3—4	...	...
1,061,779	1	Sept. 10	1/2⅜	1/2⅜	South East'n Gas Cn. Ld. Ord.	27/—29/-	...	...
845,016	1	Mar. 11	-/10⅜	-/10⅜	Do. 4½ p.c. Red. Cum. Pref.	21/9—22/9	...	22/4½
450,000	Stk.	Feb. 4	74/4	4	Do. 4 p.c. Red. Deb. ...	100—103	...	...
6,709,895	,,	Feb. 4	5	6⅓	South Met. Ord.	130—135	...	131½—135
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf. ...	147—152	...	149½
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf. ...	104—109	+1	106½—107
1,895,445	,,	Dec. 17	3	3	Do. 3 p.c. Deb.	87—92	+1	88—88½
1,000,000	,,	Jan. 7	5	5	Do. 5 p.c. Red. Deb....	113—118	...	...
209,820	,,	Feb. 18	8½	8½	South Shields Con.	174—176*d*	...	...
1,543,795	,,	Feb. 18	6	6	South Suburban Ord 5 p.c. ...	128—138	...	132½—133
512,825	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	...
500,000	,,	,,	4	4	Do. 4 p.c. Pref. ...	102—107	...	...
888,587	,,	Dec. 17	5	5	Do. 5 p.c. Deb. ...	124—129	...	127
250,000	,,	,,	4	4	Do. 4 p.c. Deb. ...	103—108	...	...
647,740	,,	Feb. 4	5	5	Southampt'n Ord. 5 p.c. max.	114—119	...	...
121,275	,,	Dec. 17	4	4	Do. 4 p.c. Deb.	102—107	...	...
350,000	,,	Feb. 4	5½	5½	Swansea 5½ p.c. Red. Pref. ...	115—120	...	117½—118
200,000	,,	Dec. 17	6½	6½	Do. 6½ p.c. Red. Deb. ...	100—105	...	...
1,076,490	,,	Feb. 18	6½	6½	Tottenham and District Ord.	148—153	...	150—151½
409,835	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	131—136	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	...
199,005	,,	Dec. 3	4	4	Do. 4 p.c. Deb. ...	103—108	...	...
369,774	,,	Feb. 4	7	7	Uxbridge, &c., 5 p.c.	150—155	...	...
108,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	118—123	...	120
1,326,700	,,	Feb.	7	7	Wandsworth Consolidated ...	155—160	+3	152—158
1,371,373	,,	,,	5	5	Do. 5 p.c. Pref. ...	121—126	...	...
1,317,964	,,	Dec. 17	5	5	Do. 5 p.c. Deb. ...	126—131	...	...
208,300	,,	,,	26/8	4	Do. 4 p.c. Deb. ...	104—109	...	...
158,400	,,	Feb. 18	5	6*g*	Winchester W. & G. 5 p.c. Con.	116—121	...	...

Quotations at :—*a*.—Bristol. *b*.—Liverpool. *c*.—Nottingham. *d*.—Newcastle. *e*.—Sheffield. *f*.—The quotation is per £1 of Stock. *g*.—Paid £3, including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year.

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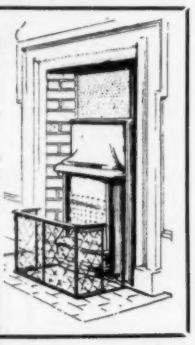

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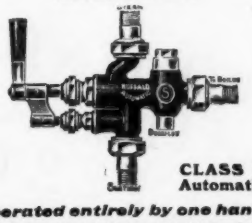

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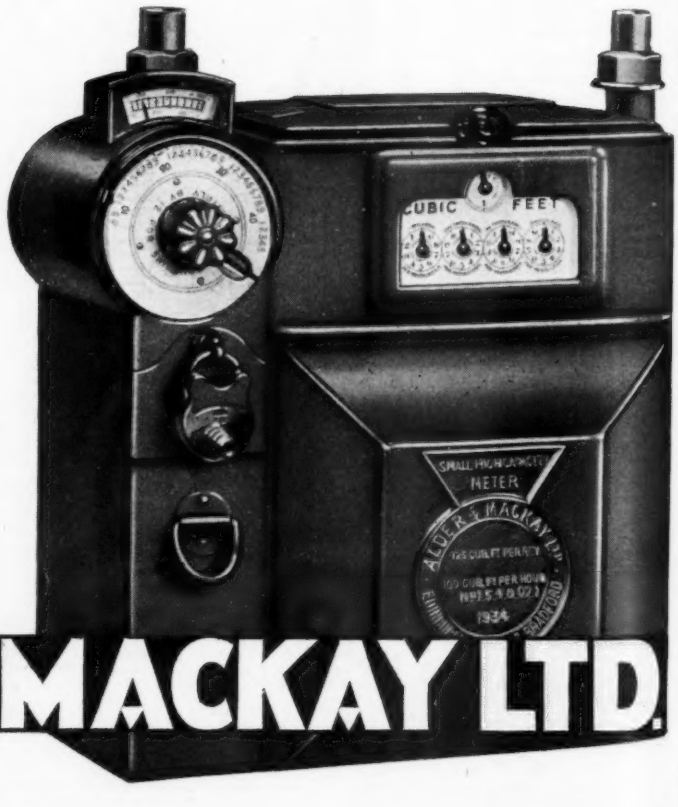

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